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BIOLOGICAL SURVEY OF THE SUSQUEHANNA RIVER AND ITS TRIBUTARIES BETWEEN COOPERSTOWN, NEW YORK, AND NORTHUMBERLAND, PENNSYLVANIA

FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
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INTRODUCTION

A biological survey of the Susquehanna River and its tributaries in the reach between Cooperstown, New York, and Northumberland, Pennsylvania, was conducted between July and October 1965. (See Figure 1.) The survey was performed at this particular time of year because of prevailing low flow conditions and high temperatures, thus showing the biological conditions during the time of greatest stress. Each biological station was sampled once for the purpose of evaluating water quality. The sampling was conducted concurrently with stream quality investigations.

For purposes of the study, the community of bottom (benthic) organisms was selected as the indicator of the biological condition of the stream. Bottom organisms serve as the preferred food source for many of the higher aquatic forms (e.g., most freshwater game fish) and exhibit similar reactions to adverse stream conditions. The combination of limited locomotion and life cycles of one year or more for most benthic species provide a long-term picture of the water quality of a stream. Fish and algal populations were given some consideration, but only to the extent that obvious conclusions could be drawn based upon casual observations.

In unpolluted streams, a wide variety of sensitive clean-water associated bottom organisms are normally found. Typical groups are stoneflies, mayflies, and caddisflies. These sensitive organisms usually are not individually abundant because of natural predation and competition for food and space; however, the total count or number of organisms at a given station may be high because of the number of different varieties present.

Sensitive organisms tend to be eliminated by adverse environmental conditions (e.g., chemicals and/or physical) resulting from wastes reaching the stream. In waters enriched with organic wastes, comparatively fewer kinds (genera) are normally found, but great numbers of these genera may be present. Organic pollution-tolerant forms such as sludgeworms, rattailed maggots, certain species of bloodworms (red midges), certain leeches, and some species of air-breathing snails may multiply and become abundant because of a favorable habitat and food supply resulting from heavy organic loadings. These organic pollution-tolerant bottom organisms may also exist in the natural environment, but are generally found in small numbers. The abundance of these forms in streams heavily polluted with organics is due to their physiological and morphological abilities to survive environmental

conditions more adverse than conditions that may be tolerated by other bottom organisms. Under conditions where inert silts or organic sludges blanket the stream bottom, the natural home of bottom organisms is destroyed, causing a reduction in the number of kinds of organisms present.

In addition to sensitive and pollution-tolerant forms, some bottom organisms may be termed intermediates, since they are capable of living in fairly heavily polluted waters as well as in clean water. These organisms occurring in limited numbers, therefore, cannot serve as effective indicators of water quality. Streams grossly polluted with toxic wastes such as mine drainage will support little, if any, biological life and will reduce the population of both sensitive and pollution-tolerant organisms.

Classification of organisms in this report is considered in three categories (clean-water, intermediate, and pollution-tolerant) which provide sufficient biological information to supplement physical and chemical water quality data for a basin-wide analysis. Detailed identification and counts of specific organisms have been tabulated for use during intensive investigations of selected areas and are available upon request.

SUMMARY AND CONCLUSIONS

1. A biological survey of the Susquehanna River and tributaries in the reach between Cooperstown, New York, and Northumberland, Pennsylvania, was conducted between July and October 1965. The West Branch Susquehanna River and the larger tributaries were also included in this study.

2. Bottom organisms were selected as the primary indicator of biological water quality.

3. Analysis of the Susquehanna River was divided into three parts: the Susquehanna River and tributaries between Cooperstown, New York, and Northumberland, Pennsylvania; the Chemung River and tributaries; and the West Branch Susquehanna River and tributaries.

4. The Susquehanna River from Cooperstown, New York, to Conklin, New York, was well-suited to support many kinds of bottom-dwelling organisms. In this entire reach, only a localized organic pollution condition at Oakland, Pennsylvania, and Susquehanna, Pennsylvania, was found. Biological and fish populations indicated good water quality in the balance of this reach.

5. Heavy to mild organic pollution was found to exist in the Susquehanna River between Binghamton, New York, and Owego, New York.

6. High water quality was generally found in the Susquehanna River between Smithboro, New York, and the Coxton Bridge in Pennsylvania (immediately upstream from the confluence with the Lackawanna River). A mild degradation was found between Sayre, Pennsylvania, and Towanda, Pennsylvania; however, the over-all quality of this reach of stream was not seriously affected.

7. In the Susquehanna River between Pittston, Pennsylvania (immediately downstream from the Lackawanna River), and Northumberland, Pennsylvania, mild to gross pollution was found to exist except for a short reach of river immediately upstream from Berwick, Pennsylvania.

8. The Unadilla River, Tioughnioga River, Chenango River, Chemung River, Towanda Creek, Tunkhannock Creek, Fishing Creek, and Wapwallopen Creek were all found to contribute toward water quality improvement in the Susquehanna River.

9. The Lackawanna River, Solomon's Creek, Warrior Run, Nescopeck Creek, and Catawissa Creek were found to contribute to the degradation of aquatic life in the Susquehanna River. The Lackawanna River, Nescopeck Creek, and Catawissa Creek contributed both mine drainage and organic wastes. Solomon's Creek and the Lackawanna River were also found to contribute coal fines; Warrior Run contributed mine drainage but no observed coal fines.

10. The Chemung River, one of the principal tributaries to the Susquehanna River, was sampled quite extensively throughout its drainage basin. The Tioga River, which is the longest reach of stream, was affected by mine drainage from Morris Run (Pennsylvania) downstream to the Canisteo River (New York). Newton Creek was found to contribute organic pollution to the Chemung River at Elmira, New York.

11. Crooked Creek, Cowanesque River, Canisteo River, and Cohocton River contributed toward improvement of water quality in the Tioga-Chemung Rivers.

12. The West Branch Susquehanna River, which enters at Northumberland, is polluted by mine drainage from its headwaters in Cambria County, Pennsylvania, downstream to Jersey Shore, Pennsylvania. Clearfield Creek, Moshannon Creek, Sinnemahoning Creek, and Kettle Creek were found to contribute to the mine drainage degradation of the West Branch Susquehanna River.

13. The West Branch Susquehanna River is occasionally acidic near the mouth because of "acid slugs" originating in the coal field watershed upstream from Lock Haven, Pennsylvania. Following a heavy rain on this watershed, "flush-out" of this acidic water may result, with subsequent discharge into the West Branch Susquehanna. One or more times a year these acid water conditions will continue downstream beyond Jersey Shore and, occasionally, reach the main stem of the Susquehanna at Northumberland, Pennsylvania.

14. Tributaries which contributed toward the improvement of water quality in the West Branch Susquehanna River were Chest Creek, Pine Creek, Lycoming Creek, Loyalsock Creek, and Muncy Creek.

15. North Bald Eagle Creek resulted in water quality improvement in the West Branch Susquehanna River by contributing high alkaline water; however, North Bald Eagle also contributed a mild organic waste load.

16. Localized impairment to biological quality in the Susquehanna River was usually the result of the degradative effects of acid water, coal fines, and organic wastes. Some tributaries, while contributing a waste load, did not exert a noticeable effect because of the relative stream flow magnitudes. Other tributaries contributed high quality water and aided biological recovery in the Susquehanna River.

DATA EVALUATION AND INTERPRETATION

In the reach of the Susquehanna River between Cooperstown, New York, and Northumberland, Pennsylvania, lateral stream mixing was generally good, and, in most cases, a single sampling point sufficed to characterize the entire station. However, in a few cases, it was necessary to take a cross-section because of upstream islands, industrial concentrations on one bank, and/or incoming tributaries. Cross-sectional sampling was done downstream from Binghamton, New York; certain stations between Pittston and Northumberland, Pennsylvania; and on the last three stations downstream on the West Branch Susquehanna River.

Sampling stations were located after consideration of the following conditions:

1. Major tributaries
2. Major waste discharges or sources
3. Physical capability for sampling

In general, tributaries were sampled to determine water quality contributed to the Susquehanna, while waste sources and major tributaries in the study area were bracketed with stations to identify effects of flow and/or waste contributions.

Quantitative bottom samples were collected primarily with a Surber Square Foot Sampler where the substrate was predominately rocks and gravel. In other areas, where the substrate was primarily sludge and gravel, a Petersen Dredge was used, and the count was converted to a square foot basis. In riffle areas, the Surber Square Foot Sampler was used exclusively. In most cases the number of organisms per square foot was based on an actual count; however, when large numbers of organisms were present, it was sometimes necessary to divide the sample and count only a section which was then multiplied by the appropriate factor to give the total count.

SUSQUEHANNA RIVER AND TRIBUTARIES

Main Stem - SUQ - 447 at Susquehanna Avenue Bridge, Cooperstown, New York

The most upstream biological station on the Susquehanna River was located at the downstream edge of Cooperstown, New York. The water at this station was very clear, with numerous fish being observed. Although only ten kinds of bottom organisms were collected, caddisflies (three kinds) and mayflies were predominant. Other clean-water organisms included two kinds of riffle beetles. Caddisflies made up 555 out of the 606 bottom organisms per square foot in the quantitative sample. Good water quality was indicated.

Main Stem - SUQ - 421 at County Road 50 Bridge near Emmons, New York

The water at this station was very clear, with good quality being indicated by the 21 different kinds of bottom organisms which included caddisflies (four kinds), mayflies (two kinds), stoneflies (two kinds), hellgrammites, riffle beetles (two kinds), and a gill-breathing snail. The quantitative sample contained 276 organisms per square foot, consisting primarily of caddisflies and riffle beetles.

Main Stem - SUQ - 418 at Lower River Street Bridge, Oneonta, New York

Good water quality was again indicated at this station by the caddisflies (four kinds), stoneflies (two kinds), mayflies (two kinds), and riffle beetles (two kinds). These clean-water organisms constituted 139 out of the 165 organisms per square foot in the quantitative sample. There was a reduction in kinds from the upstream station, 21 versus 16.

Main Stem - SUQ - 399 at State Route 7-B Bridge Upstream from Unadilla, New York

Excellent water quality was indicated at this station by the 22 kinds of bottom organisms which included stoneflies (two kinds), mayflies (three kinds), caddisflies (three kinds), and riffle beetles (two kinds). A total of 90 organisms per square foot was collected in the quantitative sample. The water was very clear and contained numerous smallmouth bass.

Unadilla River Basin - 1 station - enters main stem at mile 392.4

UND - 001 one mile above mouth

Clean water conditions were indicated at this station by the 14 kinds of bottom organisms found. They included such clean-water forms as stoneflies, mayflies (two kinds), caddisflies (two kinds), and riffle beetles (two kinds). A total of 24 organisms per square foot was observed in the quantitative sample. The Unadilla contributes good quality water to the Susquehanna River.

Main Stem - SUQ - 388 at New York Route 206 Bridge, Bainbridge, New York

Good water quality was indicated at this station by the 18 kinds of bottom organisms which numbered 725 per square foot in the quantitative sample. They included stoneflies (two kinds), mayflies (two kinds), caddisflies (three kinds), and riffle beetles (two kinds). Smallmouth bass and minnows were abundant in the area.

Main Stem - SUQ - 382 at New York Route 41 Bridge, Afton, New York

Improved water quality over the upstream station was indicated at this station by the 24 kinds of bottom organisms which included stoneflies (two kinds), mayflies (three kinds), caddisflies, and a crayfish population. The water was clear, and numerous smallmouth bass were observed.

Main Stem - SUQ - 363 at Windsor, New York, approximately 200 yards above New York Route 17 Bridge

Clean-water conditions continued at this station, as indicated by the 18 kinds of bottom organisms. Caddisflies (three kinds) were the dominant form and made up 402 out of the 536 organisms in the quantitative sample. Also included in the sample were other clean-water forms such as stoneflies, mayflies (four kinds), hellgrammites, riffle beetles (two kinds), "Unio" mussels, and crayfish. Excellent water quality was indicated at this location.

Main Stem - SUQ - 352 at Pennsylvania Route 92 Bridge Between Oakland and Susquehanna, Pennsylvania

Because of the river depth in this area, sampling was confined to the banks. Approximately 100 yards upstream from the bridge 13 kinds of bottom organisms were found. Included in the sample were sparse populations of clean-water forms such as stoneflies, mayflies, and caddisflies. However, downstream from the bridge, cloudy water and domestic waste pollution were observed. Sludge deposits were also observed, containing large numbers of sludgeworms and bloodworms (chironomus riparius). Garbage dumps and outfalls were observed on the Oakland side.

Main Stem - SUQ - 344 at U. S. Route 11 Bridge, Hallstead, Pennsylvania

As evidenced by the 16 kinds of bottom organisms collected at this location, the Susquehanna River appears to have recovered from the pollution upstream. Clean-water forms included stoneflies, mayflies (three kinds), caddisflies (three kinds), riffle beetles (two kinds), and "Unio" mussels. The water was clear, and good water quality was indicated, particularly by the excellent "Unio" mussel population.

Main Stem - SUQ - 337 at Conklin, New York, near Site of New Bridge Crossing

Twelve kinds of bottom organisms were found at this station, including stoneflies, mayflies (five kinds), and caddisflies (two kinds). Although the water was clear, only 60 organisms per square foot were taken in the quantitative sample. The small diversification and low number of organisms per square foot can be attributed to the disturbance of the stream bottom caused by the bridge and road construction in the area. Good water quality was still indicated at this point.

Chenango River Basin - 21 stations - enters main stem at mile 327.6

PAY - 005 upstream from Hamilton, New York, immediately downstream from Lake Moraine Dam

Payne Brook and its tributaries form the Chenango River at River Mile 82.9. Payne Brook was first sampled five miles above the mouth where 14 kinds of bottom organisms were found in the quantitative sample, including such clean-water forms as

stoneflies, mayflies (two kinds), caddisflies, and riffle beetles. Mayflies were the dominant form in the quantitative sample and comprised 73 of the 176 organisms in the square foot sample. The sample also included 15 stoneflies, which is rather abundant for this group. The water was very clear and cold, and moss was abundant on the rocks. Good water quality was indicated at this station.

UWP - 002 at County Road 85 near Hamilton, New York

An unnamed tributary to Payne Brook which drains out of Woodson Pond was sampled two miles upstream from the mouth. Good water quality was indicated by the nine kinds of bottom organisms collected, including such clean-water forms as mayflies, caddisflies (three kinds), water pennies, and a gill-breathing snail.

PAY - 001 at County Road 77 Bridge, near Randallsville, New York

The water at this station was fairly clear; however, a sewage odor was noticeable. Although ten kinds of bottom organisms were collected, mayflies, stoneflies, and caddisflies could not be found. Most of the organisms were pollution-tolerant forms, such as sludgeworms, air-breathing snails, and leeches, or intermediate kinds. The only clean-water forms were a riffle beetle and a gill-breathing snail. The flatworm (Dugesia) was the dominant form in the quantitative sample and made up 325 of the 351 bottom organisms sampled. Mild organic pollution was indicated by the bottom organism composition.

CHA - 070 at Earlville, New York

This sampling point was the first biological station on the Chenango River. The qualitative sample at this station indicated the presence of only nine kinds of bottom organisms. Slight improvement from the upstream station was indicated by the two kinds of riffle beetles and the gill-breathing snails. Fish were numerous; darters, dace, and smallmouth bass were observed. Recovery appeared to be taking place from upstream conditions.

CHA - 063 at New York Route 80 Bridge, Sherburne, New York

The number of kinds of bottom organisms increased from nine upstream to 13 at this station; however, the bottom organisms were intermediate to pollution-tolerant forms, except for three kinds of riffle beetles and a gill-breathing snail. The water was clear, and minnows were abundant. Conditions had

improved from the upstream station, but the stream had not recovered from the degraded conditions downstream from Hamilton, New York.

CHA - 057 at New York Route 12 Bridge, North Norwich, New York

The water at this station was clear and contained numerous fish. Although the number of kinds of bottom organisms at this station had decreased to ten versus 13 upstream, the composition was very similar. The only clean-water forms were a riffle beetle and one kind of gill-breathing snail. Most of the forms were intermediates with a few organic pollution-tolerant kinds. Stream conditions had not recovered to the level observed upstream from Hamilton, New York.

CHA - 052 at New York Route 320 Bridge, Woods Corners, near Norwich, New York

Due to the sharp drop-off at this station, sampling had to be confined to the banks, and a quantitative sample was not taken. Bottom organisms in the qualitative sample were sparse, with only eight kinds of bottom organisms being observed; however, one mayfly was found at this station. The majority of the organisms consisted of intermediate forms, with several organic pollution-tolerant kinds. Recovery still does not appear to have taken place at this station.

CHA - 039 at New York Route 220 Bridge, Oxford, New York

The water was cloudy, and some foam was observed at this station. Bottom organisms were sparse, except for sow-bugs and scuds which were abundant. Only six kinds of bottom organisms were found; a reduction from the eight kinds found at the upstream station. This station exhibited the least diversification in bottom organisms and the most degraded stream conditions of any of the upstream stations.

CHA - 022 at Intersection of New York Routes 41 and 206 Bridge, Greene, New York

At this station the number of kinds of bottom organisms had increased to 13. These organisms were primarily intermediate and organic pollution-tolerant forms; however, a few clean-water mayflies were also collected. Downstream from this station, sewage outfalls were noted, and domestic waste solids were observed in the stream. Mild organic pollution was indicated at this station.

CHA - 014 at New York Route 79 Bridge, Chenango Forks, New York

Extremely good biological conditions were indicated at this station by the 25 kinds of bottom organisms which included caddisflies (three kinds), mayflies, fishflies, "Unio" mussels (two kinds), riffle beetles (two kinds), and a gill-breathing snail. Caddisflies made up 482 of the 646 organisms in the square foot sample. The water was clear, and numerous minnows and smallmouth bass were observed. Successful fishermen were also noted at this station. The high quality of water at this station can be attributed partially to Genegantslet Creek, which enters the Chenango River in this reach at mile 19.2.

TOG - 036 at Loring Crossing Upstream from Cortland, New York

This was the most upstream station on the Tioughnioga River, which enters the Chenango River at mile 13.7. Excellent biological conditions were indicated by the 21 kinds of bottom organisms which included stoneflies, mayflies (three kinds), caddisflies (three kinds), and riffle beetles (two kinds). Although the quantitative sample was not too productive, riffle beetles comprised 51 of the 58 organisms in the square foot sample. A high quality water was indicated at this station.

WBT - 004 at U. S. Route 11 Bridge, Homer, New York

The West Branch of the Tioughnioga River joins the Tioughnioga at mile 34.7. High water quality was indicated at this station by the 18 kinds of bottom organisms. The sample included such clean-water forms as mayflies (three kinds), caddisflies (three kinds), and riffle beetles (two kinds). Caddisflies were the dominant organism and made up 362 of the 435 organisms per square foot in the quantitative sample. Riffle beetles (21) and mayflies (16) were the second and third most abundant organisms in the square foot sample, respectively.

TOG - 033 Downstream from Railroad Bridge near Cortland, New York

This station was located approximately one-half mile downstream from the Cortland Sewage Treatment Plant. The water was clear; however, dead algae were observed on the rocks at the west bank. Fourteen kinds of bottom organisms were sampled at this point versus 21 kinds at the upstream station. Thirteen of the 14 kinds of organisms were intermediates and organic pollution-tolerant forms. Except for sludgeworms and midge larvae, bottom

organisms were sparse. Sludgeworms were the dominant form and comprised 34 of the 66 organisms in the square foot sample. Organic pollution was indicated upstream.

TOG - 031 at Blodgett Mills, New York

The sampling at this station showed a further reduction in kinds to 12 versus 14 at the upstream station. Midges (162), blackflies (141), and sludgeworms (139) comprised 442 of the 457 organisms in the square foot sample. The murky appearance of the water and bottom organisms sample indicated organic pollution continues.

TOG - 025 Approximately One Mile Upstream from Messengerville, New York

The water was clear at this station, and minnows were abundant. The number of kinds of bottom organisms increased to 15 from the 12 observed upstream. Included were such clean-water forms as mayflies (two kinds), caddisflies (two kinds), riffle beetles (two kinds), and a gill-breathing snail. Midges (with 64 organisms) and caddisflies (with 42) were the dominant forms in the 134 organisms comprising the quantitative sample. Improved biological conditions were indicated, and the stream appeared to be in recovery at this location.

TOG - 020 Downstream from New York Route 221 Bridge, Marathon, New York

The water at this location was cloudy; however, 17 kinds of bottom organisms were found, which was an increase of two kinds over the upstream station. Clean-water forms included stoneflies, mayflies (two kinds), caddisflies (two kinds), and riffle beetles. The stream was still in recovery at this point.

TOG - 013 at New York Route 79 Bridge, Lisle, New York

The water was clear at this point, and fish were easily observed. While the number of kinds of organisms remained the same at 17, improved biological conditions were indicated by stoneflies, mayflies (three kinds), caddisflies (two kinds), and riffle beetles (two kinds). Caddisflies (70), mayflies (35), and riffle beetles (23) were the dominant forms in the 155 organisms collected in the square foot sample. The fact that three kinds of mayflies and one stonefly were collected in the quantitative sample indicated greatly improved conditions over the upstream station. Biologically, the stream appeared to have recovered at this location.

OST - 006 at Lauer's Corner Road, Upstream from Upper Lisle and the Whitney Point Reservoir

Otselic River is a tributary entering the Tioughnioga River at mile 9.6. Excellent biological conditions at this station were indicated by the 17 kinds of bottom organisms which included such clean-water forms as caddisflies (four kinds), mayflies (two kinds), and riffle beetles (two kinds). Out of 502 organisms per square foot in the quantitative sample, there were 347 caddisflies, 66 riffle beetles, and 56 mayflies. The unusually high number of clean-water forms was a good indication of the water quality at this location. The Otselic River contributes high quality water to the Tioughnioga River.

TOG - 000 Downstream from New York Route 12 Bridge, Chenango Forks, New York

Although there was a reduction from 17 upstream to 13 kinds of bottom organisms at this station, clean-water organisms such as stoneflies (two kinds), mayflies (three kinds), and caddisflies (three kinds) were abundant. Two kinds of riffle beetles were also collected. Eight mayflies and five stoneflies were included in the 42 organisms collected in the square foot sample. In addition, the water was clear, and numerous smallmouth bass were observed. The Tioughnioga River contributes good quality water to the Chenango River at mile 13.7.

CHA - 006 at New York Route 12-A Bridge, Chenango Bridge, New York

The water was clear, and numerous young smallmouth bass were observed. Fishermen were also noted. Due to the river depth, a quantitative sample was not taken. A total of 16 kinds of bottom organisms were collected, including such clean-water forms as stoneflies, mayflies (five kinds), caddisflies (two kinds), and riffle beetles. Although there was a substantial reduction in the number of kinds from the upstream station where 25 kinds were found, it is difficult to attribute it to the Tioughnioga River which is good quality water. About the only explanation that can be offered is that there is a greater variety of micro-habitants at the upstream station.

CHA - 000 at New York Route 17-C Bridge, Binghamton, New York

At this station the water was partially cloudy, and fish were not observed. Only ten kinds of bottom organisms could be

found, compared to 16 kinds upstream. Sparse populations of caddisflies, stoneflies, and riffle beetles were collected; the more predominant forms being an aquatic caterpillar and a midge larva. The sparse organism population could be due partially to the bridge construction at the upstream edge of Binghamton. Degradation appears to have occurred between this station and the upstream station; nevertheless, good quality water was contributed to the Susquehanna River by the Chenango River.

Main Stem - SUQ - 325 (E. B.) at C. F. Johnson Bridge opposite Johnson City, New York

This station was located on the Susquehanna River approximately one-third of the way across the river from the east bank. The water was cloudy, and the substrate was covered with a white slime. A strong sewage odor prevailed in the area. The five kinds of bottom organisms present were air-breathing snails, leeches, midges, blackflies, and an aquatic earthworm (oligochaete). The reduction in number of kinds (12 to five) from the upstream station, and the predominance of pollution-tolerant and intermediate forms at this station, indicated the presence of organic pollution.

Main Stem - SUQ - 325 (W. B.) at C. F. Johnson Bridge, Johnson City, New York

This station was located approximately one-third of the way across the river from the west bank. The water was clear, and 21 kinds of bottom organisms were collected at this location, including such clean-water organisms as stoneflies, mayflies, caddisflies (two kinds), and riffle beetles (two kinds). Riffle beetles were the dominant organisms in the quantitative sample, comprising 27 of the 57 organisms collected. Unpolluted water quality was indicated at this location and exhibited a marked contrast to the conditions observed at the station on the opposite bank.

Main Stem - SUQ - 319 (W. B.) at the new New York Route 26 Bridge, Endicott, New York

The water was turbid at this station, with oil slicks observed on the surface. Sampling was confined to the west bank due to a sharp drop-off of the river bottom and deep water extending to the opposite bank; therefore, a quantitative sample was

not taken. Bottom organisms were sparse. and only two kinds were collected--a few damselflies and flatworms. These two kinds represented a substantial reduction from the 21 kinds of organisms found at the previous upstream west bank station and is attributed to upstream pollution.

Main Stem - SUQ - 318 (W. B.) at old New York Route 26 Bridge, Endicott, New York

Due to the sharp drop-off along the bank and the absence of a riffle area, a quantitative sample was not taken. The river was blood-red on the Endicott side, and a heavy sewage odor was detected. Domestic waste solids were observed floating downstream and scattered along the bank. The only bottom organisms collected were sludgeworms. These organisms were also abundant in sludge deposits along the bank. Heavy organic pollution was indicated at this station.

Main Stem - SUQ - 317 (E. B.) Upstream from Vestal, New York Shopping Plaza, New York Route 17

High quality water was indicated at this station by the 18 kinds of bottom organisms which included stoneflies, caddisflies (two kinds), mayflies (four kinds), and riffle beetles (two kinds). Riffle beetles were the dominant form, comprising 43 organisms out of the 115 organisms in the quantitative sample. Caddisflies were the second most abundant organism. Unpolluted conditions were indicated.

Main Stem - SUQ - 313 near Apalachin, New York at the mouth of Apalachin Creek

The sampling at this station indicated the presence of 14 kinds of bottom organisms; however, all were organic pollution-tolerant or intermediate forms. Leeches and air-breathing snails were abundant. Dead carp and white suckers, as well as live fish, were observed in the area. These conditions indicated upstream organic pollution, particularly in view of the low stream flows. At the time of sampling, Apalachin Creek was dry and had no effect on the main stem.

Main Stem - SUQ - 305 at New York Route 17 Bridge, Owego, New York

The water at this station was clear, and minnows were abundant. Definite improvement from the upstream conditions was noted, as the number of kinds of bottom organisms increased to 17 versus 14 upstream. Included in the sample were mayflies, caddisflies, and riffle beetles. The dominant organisms were flatworms, with 369 out of the 492 organisms in the square foot sample. Other abundant forms were caddisflies (61) and sludgeworms (24). The river appeared to be recovering at this station.

Main Stem - SUQ - 295 at New York Route 283 Bridge, Smithboro, New York

The water was clear, and numerous minnows were observed. Clean-water forms such as mayflies (three kinds), caddisflies (two kinds), and riffle beetles (two kinds) were collected. The number of kinds of bottom organisms increased from 17 upstream to 22 at this station. Blackflies (208), riffle beetles (200), caddisflies (115), fingernail clams (99), and flatworms (92) were the dominant forms in the 872 organisms collected in the square foot sample. Twenty-two mayflies were also collected in the quantitative sample. High quality water was indicated at this station.

Main Stem - SUQ - 286 Upstream from Sayre, Pennsylvania, at U.S.G.S. Gaging Station

The water at this station was fairly clear, and fish were easily observed. Fishermen were also observed in the area. The bottom organism population did not compare with the upstream station. Only nine kinds of bottom organisms were collected, compared to 22 kinds upstream. Clean-water forms such as mayflies, caddisflies, and riffle beetles were collected. Although clean-water conditions still prevailed, the reduction in bottom organism population from that upstream indicated the stream has been degraded.

Chemung River Basin - 53 stations - enters main stem at mile 281.6

Because of the large number of stations in the Chemung River Basin and to maintain continuity in summarizing the water quality in the Susquehanna River, only a general description of

the water quality at the last station on the Chemung River will be given here. Refer to the section on Chemung River and tributaries for a more detailed description of water quality in these streams.

CHM - 005 at LR08066 Bridge west of Sayre, Pennsylvania

Sampling at this station indicated the presence of such clean-water forms as caddisflies (four kinds), mayflies (six kinds), riffle beetles (two kinds), and stoneflies. In all, 20 kinds of organisms were observed in the qualitative sample, and 514 organisms were in the quantitative sample. The biological populations at this station are indicative of good water quality being discharged from the Chemung River to the Susquehanna River.

Main Stem - SUQ - 276 at Ulster, Pennsylvania

The water at this station was clear, and fish were easily observed; numerous fishermen were also sighted in the area. Fourteen kinds of bottom organisms were collected which included such clean-water forms as stoneflies, mayflies, caddisflies (two kinds), and riffle beetles. The dominant forms were mayflies, scuds, caddisflies, damselflies, and crayfish. Unpolluted biological conditions were indicated. Improvement in water quality at this station was apparently the result of the addition of good quality water from the Chemung River at mile 281.6.

Main Stem - SUQ - 269 at U. S. Route 6 Bridge, Towanda, Pennsylvania

At this station 14 kinds of bottom organisms were collected, including clean-water mayflies, caddisflies, and riffle beetles (two kinds); however, the predominant forms were organic pollution-tolerant air-breathing snails and leeches and intermediates such as sow-bugs and scuds. In addition, the water was somewhat turbid. Some degradation in relation to the upstream station was apparent; basically, however, good quality water was still indicated.

Towanda Creek Basin - 1 station - enters main stem at mile 267.5

TOW - 001 at Airport Road Bridge south of Towanda, Pennsylvania

The water was very clear at this station, and fish such as rock bass, darters, and shiners were observed. Fishermen were also noted at this station. Twelve kinds of bottom organisms were collected, with mayflies (two kinds) and caddisflies (two kinds) being the predominant forms. Towanda Creek contributed high quality water to the Susquehanna River.

Main Stem - SUQ - 261 Upstream from the Bridge between Durell and Standing Stone, Pennsylvania

The water was clear at this location, and numerous fish including smallmouth bass were observed. Twelve kinds of bottom organisms were sampled, including such clean-water forms as mayflies, caddisflies, and riffle beetles. Mayflies and caddisflies were the dominant forms. A wide variety of submerged aquatic plants were also found in the area. The improved biological conditions over the upstream station can be attributed partially to the high quality water entering the Susquehanna from Towanda Creek.

Main Stem - SUQ - 249 at LR 14 Bridge Downstream from Wyalusing, Pennsylvania

A very significant improvement in water quality was observed at this station, as the number of kinds of benthic (bottom) organisms increased from 12 upstream to 21 at this point. The qualitative sample included such clean-water forms as stoneflies, mayflies, caddisflies (three kinds), and riffle beetles. The dominant organisms were mayflies, caddisflies, damselflies, and scuds. The water was very clear, and numerous fish, including rock bass, were observed. Heavy fishing was indicated by the presence of boat fishermen in the area. High quality water was indicated and can be attributed partially to Wyalusing Creek which enters the Susquehanna River less than one-half mile upstream.

Main Stem - SUQ - 228 at Pennsylvania Route 87 Bridge, Mehoopany, Pennsylvania

Despite a drop in the number of kinds of bottom organisms from 21 upstream to 16 at this station, extremely high water quality was indicated by the stoneflies (two kinds), caddisflies (three kinds), and mayflies. Mayflies and caddisflies were the dominant forms. In addition, the water was clear, and numerous smallmouth bass were observed. Heavy fishing was observed throughout the area. Meshoppen Creek, a high quality stream, enters upstream at mile 231.0.

Tunkhannock Creek Basin - 1 station - enters main stem at mile 216.5

TUK - 001 at U. S. Route 6 Bridge Upstream from Tunkhannock, Pennsylvania

Unpolluted biological conditions were indicated by the 13 kinds of bottom organisms which included stoneflies (three kinds), mayflies (three kinds), and caddisflies (four kinds). The water was clear, and numerous fish were noted. Fishermen were also observed throughout the area. Tunkhannock Creek contributes high quality water to the Susquehanna River.

Main Stem - SUQ - 206 at Pennsylvania Route 92 Bridge, Falls, Pennsylvania

This station showed the greatest diversification of any biological station in the Susquehanna River Basin with 28 kinds of bottom organisms. Clean-water forms included stoneflies (three kinds), mayflies (two kinds), caddisflies (five kinds), and riffle beetles (two kinds). Mayflies, caddisflies, and water pennies predominated. The water was slightly cloudy due to a plankton bloom; however, four different species of submerged aquatic plants were collected. In addition, numerous fishermen were observed in the area on the bank, wading, and in boats. Excellent biological conditions were indicated. Mehoopany Creek, Tunkhannock Creek, and Bowman's Creek (three good quality streams) enter the Susquehanna River in this reach.

Main Stem - SUQ - 196 at Coxton Railroad Bridge, Upstream from the Lackawanna River

Due to a sharp drop-off in this area, sampling was confined to the banks, and a quantitative sample was not taken. The bottom organism population exhibited a reduction from 28 kinds upstream to ten kinds at this location; however, clean-water forms predominated. Mayflies were abundant and were found on nearly every rock. Water pennies, stoneflies, and caddisflies were also easily collected. Unpolluted biological conditions were indicated at this station.

Lackawanna River Basin - 11 stations - enters main stem at mile 195.4

LAK - 044 at Herrick Center, Pennsylvania

The water at this upstream location was very clear, and numerous minnows were observed. Unpolluted biological conditions were indicated by the 21 kinds of bottom organisms which included such clean-water forms as stoneflies (four kinds), mayflies (five kinds), caddisflies (four kinds), and riffle beetles (two kinds). Of the 191 organisms in the square foot sample, 72 were caddisflies, 30 were mayflies, and five were riffle beetles. Very high water quality was indicated by the bottom organism population.

LAK - 041 Immediately Downstream from Stillwater Dam

The water was clear, but a reduction occurred in the number of kinds of bottom organisms from the 21 upstream to eight kinds at this location. However, unpolluted biological conditions were indicated by the abundant mayfly population (two kinds) and gill-breathing snails (two kinds). Crayfish were also abundant. Clean water is also indicated by the presence of moss animalcules (Bryozoan Pectinatella). Moss animalcules are associated with unpolluted and unsilted waters and are rarely found where the quantity of dissolved oxygen falls below 30 per cent saturation. Moss animalcules are almost never present in strongly acidic waters, but are usually found in fresh waters with a pH range of 5.3 to 8.0. The substantial drop in diversification of organisms at this station can be attributed to change in environment caused by the Stillwater Dam.

LAK - 039 at Pennsylvania Route 171 Bridge downstream from Stillwater Dam

Only seven kinds of bottom organisms were found at this station, but caddisflies (three kinds) and mayflies predominated. In addition, numerous colonies of moss animalcules were observed. Unpolluted stream conditions were indicated.

LAK - 031 at Pennsylvania Route 171 Bridge at Simpson, Pennsylvania

The number of kinds of bottom organisms increased from seven upstream to ten at this station, including such clean-water forms as stoneflies, mayflies (three kinds), and caddisflies (three kinds). Caddisflies and mayflies were the dominant forms. The water was clear, and numerous minnows were observed. A quantitative sample was not taken because of the large rocks which appeared "cemented" together and prohibited a reliable quantitative sample. Unpolluted conditions were indicated at this station.

LAK - 027 at T477 Bridge, Childs, Pennsylvania

The water at this station was cloudy with a heavy flocculent substance. A strong sewage odor prevailed, and raw domestic waste solids were observed throughout the stream. Garbage was observed along the banks. The only bottom organisms present were sludgeworms, bloodworms, and leeches--all organic pollution-tolerant. The sludgeworms comprised 32,666 of the 32,895 organisms in the square foot sample. Even in the gravel in the middle of the stream, sludgeworms were clustered in "little balls." Heavy organic pollution was indicated at this station.

LAK - 023 at LR35048 Bridge, Archbald, Pennsylvania

The water at this point was clear, and filamentous algae were abundant on the rocks. The substrate was coated with iron compounds. Garbage and refuse dumps along the banks were numerous. In one instance, an individual was observed throwing garbage into the stream. Only four kinds of bottom organisms were found, including organic pollution-tolerant sludgeworms and bloodworms. Only 35 bottom organisms were found in the square foot sample, which consisted of 29 bloodworms and six sludgeworms. The only other organisms collected were the acid-tolerant smoky alderfly (Sialis) larvae and a beetle larva. The low productivity and small diversification of bottom organisms may be attributed to the low pH (4.0 to 5.56) and the high total iron concentrations

(0.53 to 2.75 mg/l) recorded at this station by samplers during 1965. Organic pollution and mine drainage were indicated.

LAK - 018 Upstream from Pennsylvania Route 347 Bridge between Olyphant and Blakely, Pennsylvania

The water at this location had a heavy floc and a strong sewage odor. Coal fines were heavy, and sludge deposits covered much of the bottom, even out in the middle of the stream. Beneath the bridge raw sewage containing fecal material was observed flowing from outfalls on each side of the river; the waste concentration was particularly heavy on the west side. The only bottom organisms collected were bloodworms, sludgeworms, and rattail maggots--all of which are organic pollution-tolerant. Of the 96 organisms in the square foot sample, 94 were bloodworms, and the other two were rattail maggots. Gross organic pollution was evident.

LAK - 013 at Pennsylvania Route 307 Bridge, Scranton, Pennsylvania

The water at this station was very turbid with a strong sewage odor. Coal fines were abundant, and heavy sludge deposits were noted along the banks. The only bottom organisms found were sludgeworms, an aquatic earthworm, and bloodworms. Sludgeworms comprised 95,514 of the 95,642 organisms in the square foot sample. The only other organisms in the quantitative sample were bloodworms. In addition, what appeared to be blood from a slaughter or packing operation upstream was noted. Numerous rats were observed running up and down the banks and swimming in the stream. This was, without equivocation, the most heavily polluted biological station in the Susquehanna River Basin.

LAK - 005 Upstream from LR35064 Bridge, between Moosic and Old Forge, Pennsylvania

The water at this station was quite turbid, and a sewage odor prevailed. A heavy floc, as well as raw domestic waste solids, were observed in the stream. The three kinds of bottom organisms observed were sludgeworms, rattail maggots, and bloodworms, all being organic pollution-tolerant. Sludgeworms were the dominant organism and composed 6,396 of the 6,398 organisms collected in the square foot sample. Gross organic pollution was indicated.

LAK - 003 at LR35055 Bridge, Old Forge, Pennsylvania

A heavy floc in the water and a strong sewage odor were noticed at this station. Sludge deposits covered much of the bedrock in the slower moving sections of the stream. Sludgeworms were the only bottom organisms found and totaled 12,865 organisms per square foot in the quantitative sample. Gross organic pollution was indicated at this point.

LAK - 001 between LR35011 Bridge at Duryea, Pennsylvania and the Duryea Gravity Outfall

Coal fines and sludge deposits were present at this station. The main part of the river upstream was turbid, and a sewage odor was noted. Clear water followed the east bank (the side on which the Duryea Gravity Outfall is located upstream). The only bottom organisms found were organic pollution-tolerant bloodworms and sludgeworms. The sludgeworms were the dominant form and comprised 541 of the 562 organisms obtained per square foot in the quantitative sample. The low number of bottom organisms per square foot, 562 versus 12,865 upstream, is attributed to the Old Forge Bore Hole on the west bank and the Duryea Gravity Outfall on the east bank which contribute considerable flow between this station and the upstream stations. Total iron concentrations up to 51.0 mg/l, conductivities of 400 to 1,700, and pH as low as 3.2 were previously recorded at this station. Downstream from the LR35011 Bridge, a meat packing operation had its waste outfall. Sludge deposits were heavy, and sludgeworms were abundant from this area downstream. Garbage dumps along the banks were also noted downstream from the bridge. The Lackawanna River contributes coal fines, mine drainage, sludge, and organic pollution to the Susquehanna River where it enters at mile 195.4.

Main Stem - SUQ - 194 (E. B.) at U. S. Route 11 Bridge, Pittston, Pennsylvania

This station was located about 1.4 miles downstream from the confluence of the Lackawanna River and approximately one-third of the way across the river from the east bank. The water was murky and contained noticeable quantities of domestic waste solids among the rocks. The bridge abutments and the rocks were heavily coated with iron compounds. Only ten kinds of bottom organisms were found, but they included such clean-water forms as stoneflies (two kinds), mayflies (two kinds), caddisflies (two kinds), and a riffle beetle. However, the dominant forms were organic pollution-tolerant leeches and air-breathing snails.

A quantitative sample was not taken at this station because of the large rocks and river depth. Dead as well as live fish were observed in the area. Clean-water organisms at this station were sparse in comparison to those found at the station upstream from the confluence of the Lackawanna River. The river appeared to be in a zone of degradation at this station, and mild pollution was indicated.

Main Stem - SUQ - 194 (W. B.) downstream from U. S. Route 11 Bridge, West Pittston, Pennsylvania

This station was located approximately one-third of the way across the river from the west bank. The water was cloudy, and heavy filamentous green algal mats were observed along the shore. Fourteen kinds of bottom organisms were collected, including such clean-water forms as hellgrammites, mayflies (two kinds), and riffle beetles. The quantitative sample contained 235 organisms, with the dominant forms being midge larvae (52), aquatic earthworms (48), scuds (Hyalella) (48), riffle beetles (36), and sludgeworms (26). The square foot sample also contained 14 leeches and seven mayflies. Coal fines were also abundant in the quantitative sample. Clean-water forms did not predominate at this station as they did at the station upstream from the Lackawanna River. The river is in a zone of degradation at this location, and mild pollution was indicated.

Main Stem - SUQ - 192 (E. B.) at Eighth Street Bridge Across the River from Wyoming, Pennsylvania

The river was murky at this station, and domestic waste solids were observed along the shore. Only a qualitative sample was taken due to the drop-off along shore and the absence of a riffle area. Six kinds of bottom organisms were sampled versus ten upstream. These organisms were intermediate and organic pollution-tolerant forms, with air-breathing snails predominating. A biological sample was not taken on the Wyoming side due to the depth and poor access. Occasional low dissolved oxygen readings (e.g., 2.73 to 3.3 mg/l) were recorded during the water quality investigations at this station. Organic pollution from upstream was indicated.

Main Stem - SUQ - 186 (E. B.) at U. S. Route 309 Bridge, Wilkes-Barre, Pennsylvania

This station was located approximately one-third of the way across the river from the east bank. The water was somewhat turbid and contained some domestic waste solids among the rocks. Heavy coatings of iron compounds were observed on the rocks in addition to the presence of noticeable quantities of coal fines in the water. Only seven kinds of bottom organisms were found, but these included such clean-water forms as stoneflies (two kinds), mayflies, hellgrammites, caddisflies, and riffle beetles. The only abundant organism was a midge larva which comprised 80 of the 88 organisms in the square foot sample. The other organisms in the quantitative sample consisted of four riffle beetles, three caddisflies, and one stonefly. Occasional low dissolved oxygen readings (e.g., 1.64 to 3.83 mg/l) and occasional high total iron concentrations (e.g. 1.12 to 1.59 mg/l) were recorded for this station. Mild pollution was indicated at this station, despite improvement in the bottom organism population over the upstream station.

Main Stem - SUQ - 186 (W. B.) at U. S. Route 309 Bridge, Kingston, Pennsylvania

This station was located approximately one-third of the way across the river from the west bank. The rocks were coated with heavy iron compounds, and coal fines were abundant. Domestic waste solids were also observed in the area. Despite the apparent degradation, 13 kinds of bottom organisms were found which included stoneflies, caddisflies (two kinds), mayflies, and riffle beetles. Only 14 organisms per square foot were obtained in the quantitative sample, with midge larvae being the dominant form with eight organisms. The remainder of the quantitative sample was made up of two caddisflies, two mayflies, one riffle beetle, and one aquatic earthworm. On a comparative basis to the upstream station, the present station may be classified as mildly polluted.

Main Stem - SUQ - 184 (E. B.) at FAP Bridge, Iona, Pennsylvania

This station was located approximately half-way between the east bank and Richard's Island. The water was murky, and "sewage mold" (Sphaerotilus) was present on the rocks. Domestic waste solids were observed along the shore and on the rocks in the river. Only five kinds of bottom organisms were found; all were organic pollution-tolerant and intermediate forms. Bloodworms were the dominant organism in the quantitative sample with

52 organisms per square foot. Other organisms in the quantitative sample were leeches (27), sow-bugs (21), and one air-breathing snail. Organic pollution was indicated at this station.

Main Stem - SUQ - 184 (W. B.) at FAP Bridge, Plymouth, Pennsylvania

This station was located approximately one-half way between the west bank and Richard's Island. Since the bottom organisms at this station were sparse, a quantitative sample was not taken. Nine kinds of bottom organisms were collected in the quantitative sample, including one stonefly, and a few mayflies, caddisflies, and riffle beetles. Air-breathing snails, bloodworms, and sow-bugs were the dominant bottom organisms. A reduction in kinds of bottom organisms, from 13 upstream to nine at this station, had occurred. Mild organic pollution was indicated.

Solomon's Creek Basin - 1 station - enters main stem at mile 182.2

SOL - 001 at LR40033 Bridge northeast of Buttonwood, Pennsylvania

The water at this station was murky, and the bottom appeared to consist of solid coal fines. Bottom organisms could not be found. Solomon's Creek contributes coal fines and poor quality water to the Susquehanna River.

Warrior Run Basin - 1 station - enters main stem at mile 180.8

WAR - 001 near Dundee, Pennsylvania, 0.25 mile upstream from LR40033 Bridge (Main Street)

Extremely heavy iron compounds were on the rocks at this location, and the water had a reddish-brown tint. Bottom organisms could not be found. Warrior Run contributes mine drainage to the Susquehanna River.

Main Stem - SUQ - 179 (E. B.) at FAP Bridge Upstream from Nanticoke, Pennsylvania

This station was located approximately one-third of the way across the river from the east bank. Heavy iron compounds were present on the rocks and bridge abutments. Bottom organisms

were sparse, and a quantitative sample was not taken. Only a few sow-bugs and bloodworms were collected. The scant bottom organism population can be attributed to mine drainage and organic pollution upstream. A sample was not taken on the West Nanticoke side because of inaccessibility and deep water.

Main Stem - SUQ - 174 (E. B.) at Retreat State Hospital

The water at this station was murky and deep; therefore, sampling had to be confined close to the east bank. Since bottom organisms were very sparse, a quantitative sample was not taken. Only six kinds of bottom organisms were found, but included in the sample were a few mayflies and riffle beetles. Bloodworms, sow-bugs, flatworms, and a beetle larva were the only other forms found. Dissolved oxygen at this station was usually observed to be about 4.0 and 5.0 mg/l, with an occasional low of 1.0 mg/l. Mild organic pollution was still indicated at this station.

Main Stem - SUQ - 169 (W. B.) at Pennsylvania Route 29 Bridge, Shickshinny, Pennsylvania

The water was turbid at this west bank station, and only five kinds of bottom organisms were found. The only clean-water forms were a few riffle beetles. Sow-bugs were the predominant organisms at this station. Other observed organisms were a few leeches, bloodworms, and flatworms. Carp were observed swimming in the area. Occasional low dissolved oxygen readings of approximately 1.64 mg/l have been recorded at this station, although the dissolved oxygen is usually higher than this. Based on the bottom organisms and known water chemistry, recovery appears to be starting at this location.

Wapwallopen Creek Basin - 2 stations - enters main stem at mile 164.4

WAP - 019 at Pennsylvania Route 437, south of Mountain Top, Pennsylvania

While only nine kinds of bottom organisms were found at this station, seven were clean-water forms, including stoneflies (two kinds), mayflies (three kinds), and caddisflies (two kinds). Unpolluted water was indicated at this station.

WAP - 000 at Pennsylvania Route 29 Bridge, Wapwallopen, Pennsylvania

The water was very clear, and numerous minnows were observed at this station. A total of 20 kinds of bottom organisms were collected in the qualitative sample. An unusually large population of stoneflies (four kinds) was found. Other clean-water forms included mayflies (four kinds) and caddisflies (four kinds). The predominant forms in the 210 organisms comprising the square foot sample were caddisflies (121), midges (63), and mayflies (15). Wapwallopen Creek contributes high quality water to the Susquehanna River.

Main Stem - SUQ - 159 (E. B.) Upstream from Pennsylvania Route 93 Bridge at Nescopeck, Pennsylvania

At this station the quantitative sample was taken approximately one-third of the way across the river from the Nescopeck (east) side. The water was clear, and numerous fish were observed throughout the area. The qualitative sample indicated the presence of 14 kinds of bottom organisms which included stoneflies, mayflies, caddisflies (four kinds), riffle beetles, and crayfish. Caddisflies were the dominant form and comprised 353 of the 358 organisms collected in the square foot sample. Other organisms in the square foot sample were riffle beetles (three), mayflies (one), and one beetle larva. The excellent riffle area across the river at this point enabled the sampling crew to work this station thoroughly from bank to bank. Based on the biological data, the river appeared to be recovered at this station. Recovery may be attributed to Wapwallopen Creek, which enters upstream, as well as natural purification processes of the river itself.

Main Stem - SUQ - 159 (W. B.) Upstream from Pennsylvania Route 93 Bridge at Berwick, Pennsylvania

The quantitative sample was taken one-third of the way across the river from the Berwick (west) side. The water was clear, and numerous fish were again observed throughout the area.

Only eight kinds of bottom organisms were sampled, but these included such clean-water forms as mayflies (two kinds), caddisflies (two kinds), and riffle beetles. Caddisflies (176), midge larvae (144), and blackflies (33) were the dominant forms in the square foot sample of 355 organisms. Although this station did not have the diversification of the station on the

opposite side of the river, the abundance of clean-water organisms and the large fish population indicated unpolluted conditions. The river appeared to have recovered at this point from the upstream pollution.

Nescopeck Creek Basin - 5 stations - enters main stem at mile 158.9

NES - 039 at Pennsylvania Route 437 Bridge southeast of Mountain Top, Pennsylvania

The water was clear and cold at this station, and minnows were easily observed. Although only seven kinds of bottom organisms were collected, six were clean-water forms such as stoneflies, mayflies (two kinds), and caddisflies (three kinds). Unpolluted biological conditions were indicated.

NES - 023 at U. S. Route 309 Bridge north of Hazleton, Pennsylvania

At this station the water was clear, and fish were easily observed. Only eight kinds of bottom organisms were found; these included clean-water forms such as stoneflies, mayflies (four kinds), and caddisflies (two kinds). Unpolluted biological conditions were indicated at this station.

NLN - 001 at County Road Bridge east of Subertsville, Pennsylvania

Little Nescopeck Creek enters Nescopeck Creek at mile 18.0. Extremely heavy iron compounds were observed on the rocks at this station. Bottom organisms could not be found, and the pH at this location was 4.3. Little Nescopeck Creek contributes mine drainage to Nescopeck Creek.

NES - 018 at Pennsylvania Route 29 Bridge north of Conyngham, Pennsylvania

Heavy iron deposits were on all of the rocks, and bottom organisms could not be found. Mine drainage was indicated at this station.

NES - 001 at Pennsylvania Route 242 Bridge, Nescopeck, Pennsylvania

The water was very clear at this station, and iron compounds were observed on the rocks. Some filamentous green algae

were present. Only three kinds of bottom organisms were present, all of which were pollution-tolerant forms and consisted of bloodworms, sludgeworms, and a smoky alderfly larva. Bloodworms, comprising 115 of the 116 organisms in the square foot sample, were found in the gravel or in sludge deposits. Nescopeck Creek contributes organic pollution and mine drainage to the Susquehanna River at mile 158.9.

Main Stem - SUQ - 155 (E. B.) Upstream from the Bridge at the Town Park, Mifflinville, Pennsylvania

At this station the water was clear, and some iron compounds were observed on the rocks. The bottom organism population was very sparse at this station, and only five kinds could be isolated in the qualitative sample. In approximately 30 minutes of qualitative sampling, only one caddisfly, one damselfly, two bloodworms, two smoky alderfly larva, and one beetle larva could be found. A quantitative sample was not taken because of the sparse organism population. The pH at this station has been reported to range from 5.5 to 7.2 mg/l. Degradation from the upstream station was indicated by the reduction in the number of kinds of organisms from 14 upstream to five at this station.

Main Stem - SUQ - 147 (W. B.) at Pennsylvania Route 339 Bridge Upstream from Bloomsburg, Pennsylvania

This station was located about one-third of the way across the river from the west bank. The water was cloudy and contained a heavy filamentous green algal mat along the bank. Bottom organisms were sparse, and only two caddisflies and one damselfly were found. A quantitative sample was not taken because of the sparse organism population. The pH at this station ranged from 5.6 to 8.8. Degradation from upstream was indicated.

Fishing Creek Basin - 1 station - enters main stem at mile 145.4

FIS - 000 at LR19079 Covered Bridge, Rupert, Pennsylvania

Some fish were observed at this station, although the water was cloudy. Eight kinds of bottom organisms were sampled, including such clean-water forms as stoneflies, mayflies (three kinds), caddisflies, and water pennies; mayflies and caddisflies

were the dominant forms in the sample. Only eight organisms were collected in the square foot sample. This low number of organisms may be attributed to the presence of very large rocks which prevented a representative sample from being taken. High quality water was contributed to the Susquehanna River.

Main Stem - SUQ - 144 (E. B.) Upstream from Pennsylvania Route 42 Bridge, Catawissa, Pennsylvania

This station was located approximately one-third of the way across the river from the east bank. The water was clear, and filamentous green algae were present. Only seven kinds of bottom organisms were present, the dominant forms being caddisflies and midge larvae. They comprised 152 of the 156 organisms in the square foot sample. Other bottom organisms sampled included air-breathing snails, blackflies, sludgeworms, and a riffle beetle. While slight improvement was noted from the upstream station, this sampling point still exhibited mild degradation.

Main Stem - SUQ - 144 (W. B.) Upstream from Pennsylvania Route 42 Bridge, Opposite Catawissa, Pennsylvania

This station was located approximately one-third of the way across the river from the west bank. The water was clear, and filamentous green algae were present. Only five kinds of bottom organisms were found, and these included caddisflies (two kinds), blackflies, a riffle beetle, and an air-breathing snail. Only 27 organisms were collected in the square foot sample, consisting of 25 caddisflies and two riffle beetles. Although an improvement had taken place in the number of kinds of organisms over the upstream station (five versus two), the low number of kinds plus the small number of organisms in the quantitative sample indicated that degraded stream conditions upstream were still affecting bottom fauna.

Catawissa Creek Basin - 4 stations - enters main stem at mile 143.5

CTW - 031 at Pennsylvania Route 924 Bridge northeast of Brandonville, Pennsylvania

The water was very clear at this station, and the rocks were a russet-red color. The only bottom organisms found were sparse numbers of smoky alderfly larvae which are tolerant of acid water. Mine drainage was indicated.

CTW - 024 at Pennsylvania Route 339 Bridge, Zions Grove, Pennsylvania

At this station the water was very clear, and the rocks were a russet-reddish color. A very thick moss was noticed on many of the rocks. The only organisms present were sparse numbers of smoky alderfly larvae. Mine drainage was still indicated.

CTW - 007 at Pennsylvania Route 339 Bridge Upstream from Mainville, Pennsylvania

The water at this station remained very clear, and the rocks still had a deep russet-red color. The only bottom organisms present were a few smoky alderfly larvae and some small midge larvae. A quantitative sample was not taken because of the small number of bottom organisms. Mine drainage was still indicated.

CTW - 000 between LR19011 Bridge and Railroad Bridge at Catawissa, Pennsylvania

The only bottom organisms found at this station were smoky alderflies, midge larvae, and a beetle larva. Smoky alderflies were easily found in the gravel. Only 14 bottom organisms were collected in the square foot sample. The quantitative sample consisted of 12 beetle larvae, one midge larva, and one smoky alderfly larva. The stream about 200 feet downstream from the station was being polluted by two outfalls from the east bank (Catawissa). Domestic sewage and solids were observed, and sludge deposits had accumulated below the outfalls. Mine drainage and organic pollution from this stream were contributed to the Susquehanna River at mile 143.5.

Main Stem - SUQ - 135 (E. B.) at Pennsylvania Route 45 Bridge, Riverside, Pennsylvania

This station was located approximately one-third of the way across the river from the east bank at a good riffle area. The water was clear, and minnows were easily observed. Only four kinds of bottom organisms were found, consisting of caddisflies (two kinds), bloodworms, and an air-breathing snail. The quantitative sample consisted of 46 organisms per square foot.

It is interesting to note that only four kinds of bottom organisms were found at this station during the sampling of 1964, and the quantitative sample consisted of only 15 organisms per

square foot. Coal fines were still abundant on the bottom. Except for a slight change in generic composition and an increase in the quantitative total, mild degradation from upstream was still indicated.

Main Stem - SUQ - 135 (W. B.) Downstream from Pennsylvania Route 45 Bridge, Danville, Pennsylvania

The station was located approximately one-third of the way across the river from the west bank. Again only four kinds of bottom organisms were found, and these consisted of caddisflies, midge larvae, air-breathing snails, and flatworms. Midge larvae were the dominant organisms in the quantitative sample, comprising 104 of the 114 organisms. Other organisms in the square foot sample consisted of nine caddisflies and one flatworm.

The water was clear, and minnows and tadpoles were readily observed throughout the area. Coal fines were easily found over much of the bottom, and filamentous green algae were abundant on the rocks in much of the area. Mild degradation was still indicated.

Main Stem - SUQ - 124 (E. B.) Upstream from Pennsylvania Route 147 Bridge, Northumberland, Pennsylvania

This station was on the east side. The water was clear, with filamentous green algae being observed on the rocks. Numerous fish were observed throughout the area. The qualitative sample contained 12 kinds of bottom organisms; however, only one riffle beetle and two kinds of caddisflies were present. The rest of the organisms were intermediate and organic pollution-tolerant forms. Productivity of bottom organisms was very low on this side of the river, and only 61 organisms per square foot were collected in the quantitative sample. Sludgeworms (21), midge larvae (19), and caddisflies (19) were the dominant forms. Heavy coal fines were also present in this sample. The only other organisms in the square foot sample were an air-breathing snail and a riffle beetle. While definite biological improvement had taken place, mild degradation upstream was still indicated.

Main Stem - SUQ - 124 Downstream from Pennsylvania Route 147 Bridge, Northumberland, Pennsylvania

This station was located at the island in the middle of the river below Route 147 Bridge. The water here was clear, and

numerous fish were observed. A heavy filamentous algal growth was observed on the rocks, and coal fines were noticed on the bottom. Again 12 kinds of bottom organisms were sampled, including two kinds of caddisflies. The rest of the organisms were intermediate and organic pollution-tolerant forms. Blackfly larvae were the dominant forms, comprising 332 of the 398 organisms in the quantitative sample. Caddisflies (39), midge larvae (25), a beetle larva, and a sludgeworm completed the square foot sample. Mild degradation from upstream was still indicated.

Main Stem - SUQ - 124 (W. B.) Upstream from Pennsylvania Route 147 Bridge, Northumberland, Pennsylvania

This station was located approximately one-third of the way across the river from the west bank. The water was clear, and numerous fish were observed, including smallmouth bass. A very heavy growth of filamentous green algae was observed near the west bank. Only 10 kinds of bottom organisms were found at this location, but the composition was quite similar to that found on the east bank and in the middle of the river. Midge larvae were the dominant forms, comprising 360 of the 372 organisms found in the square foot sample. The balance of the quantitative sample consisted of five sludgeworms, four caddisflies, two bloodworms, and one blackfly larva. Heavy coal fines were also present in the sample. The Susquehanna River contributes coal fines and some organic pollution to the lower main stem at mile 124.

CHEMUNG RIVER AND TRIBUTARIES

Chemung River Basin* - 53 stations - enters main stem at mile 281.6

* The Tioga and Cohocton Rivers join to form the Chemung River. The Tioga River is considered the main stem and is, therefore, indexed as a continuation of the Chemung River.

TIO - 088 Upstream from Confluence of Morris Run

This was the most upstream biological station on the Tioga River. The water at this station was cold and clear. The bottom organism population was sparse, and only five kinds (genera) were found; however, all were clean-water forms consisting of mayflies (three kinds), stoneflies, and caddisflies. A quantitative sample was not taken because of the sparse benthic (bottom) population. Good water quality conditions were indicated at this station.

MOR - 001 Approximately 0.6 mile Upstream from the Confluence with Tioga River

Morris Run enters the Tioga River at mile 86.2. The stream bottom at this station was covered with heavy coal fines and organic sludge; the rocks were coated with iron compounds. The only bottom organism found was an organic pollution-tolerant bloodworm, of which 946 per square foot were obtained in the quantitative sample. This stream was polluted with domestic wastes from the town of Morris Run and with coal fines and mine drainage from upstream sources. This stream contributed mine drainage, coal fines, and domestic organic pollution to the Tioga River.

TIO - 087 Between Morris Run and Coal Run, at Blossburg, Pennsylvania

At this station heavy iron compounds were observed on the rocks, and sludge deposits were observed on the stream bottom. The bottom organism population was non-existent, apparently the effect of mine drainage and organic pollution from Morris Run.

TIO - 085 at A7412 Bridge, Blossburg, Pennsylvania

This station was located downstream from Coal Run. The rocks were heavily coated with iron compounds, and sludge deposits

had collected between the rocks. The only organisms found were organic pollution-tolerant bloodworms; these were present only in the sludge deposits. Domestic solids were observed in these deposits and, when the sludge was disturbed, oil slicks oozed upward. A quantitative sample was not taken because of the sparse number of bottom organisms. Mine drainage and domestic organic pollution were indicated.

TIO - 080 at U. S. Route 15 Bridge, Upstream from Covington, Pennsylvania

The water was clear at this station with heavy iron compounds observed on the rocks. Some algal growths were observed, but bottom organisms could not be found. Mine drainage was indicated.

TIO - 079 at Pennsylvania Route 660 Bridge, Downstream from Covington, Pennsylvania

The absence of bottom organisms and the presence of iron compounds on the rocks indicated mine drainage pollution continued.

TIO - 072 at LR58044 Bridge at Lambs Creek, Pennsylvania Downstream from Mansfield, Pennsylvania

At this station the water remained very clear, with heavy iron compounds noticeable on the rocks. The bottom organisms were very sparse; only two kinds of midge larvae being found. A quantitative sample was not taken because of the sparse population. Mine drainage conditions were still indicated.

TIO - 067 at U. S. Route 15 Bridge Upstream from Tioga, Pennsylvania

The water was still clear at this station, with heavy iron compounds observed on the rocks. Bottom organisms could not be found. The effects of mine drainage were still indicated.

TIO - 066 at U.S.G.S. Gaging Station, Tioga, Pennsylvania

At this station the water was still clear, with iron compounds visible on the rocks. Some dead algae were observed on the rocks, and bottom organisms were still absent. Mine drainage still appeared to exert a detrimental effect on the biological environment.

CRK - 001 at Brookton, west of Tioga, Pennsylvania

Crooked Creek enters the Tioga River at mile 65.2. Only four kinds of bottom organisms were found at this station, including clean-water forms such as caddisflies (two kinds), which were very abundant, and mayflies. The water was clear and contained a heavy growth of filamentous green algae. Fair biological conditions, with some enrichment from phosphorus and nitrogen, were indicated.

CRK - 000 at U. S. Route 15 Bridge, Tioga, Pennsylvania

Only two kinds of bottom organisms were present at this station; these forms consisted of mayflies and caddisflies. However, both were present in moderate numbers. Filamentous algae were also present at this station. Crooked Creek contributed good quality water to the Tioga River.

TIO - 065 at U. S. Route 15 Bridge Downstream from Crooked Creek and Tioga, Pennsylvania

The water in this area had a marked bluish-green color, possibly from the interaction of the alkaline water from Crooked Creek with the acid water of the Tioga River. The rocks were covered with a grayish-gel deposit which appeared to be dead algae. Bottom organisms were absent, indicating the possible effects of mine drainage continuing from upstream.

TIO - 061 at T773 Bridge Upstream from Lawrenceville, Pennsylvania

The water continued to have a bluish-green tinge, and the grayish-gelatinous material covered all of the rocks at this station. Bottom organisms still could not be found.

TIO - 059 at U. S. Route 15 Bridge Upstream from Lawrenceville, Pennsylvania

Stream and biological conditions at this station were identical to the two previous stations, thus still exhibiting the effects of mine drainage.

COW - 027 at Pennsylvania Route 49 Bridge, Westfield, Pennsylvania

This was the most upstream biological station on the Cowanesque River. The water was very clear and cold at this

station, and an abundance of minnows was observed. A total of 14 kinds of bottom organisms was collected in the quantitative sample, including such clean-water forms as caddisflies (three kinds), mayflies (two kinds), stoneflies (two kinds), and riffle beetles (two kinds). Caddisflies were the dominant form and comprised 1,204 of the 1,343 bottom organisms in the quantitative sample. Mayflies, the second most abundant form, comprised 83 organisms in the quantitative sample. Based on the biological data, extremely high water quality was indicated.

COW - 023 at Pennsylvania Route 249 Bridge, Phillips, Pennsylvania

At this station the water was clear and cold, with minnows in abundance. Heavy growths of duckweed and green algae (Hydrodictyon) were observed. Although ten kinds of bottom organisms were sampled, all were sparse except for the air-breathing snails. Clean-water forms consisted of caddisflies, water pennies, and mayflies. However, a substantial reduction had occurred in kinds (ten versus 14 upstream) and in organisms per square foot (61 versus 1,343 at the upstream station). Although a few clean-water organisms existed at this station, degraded biological conditions were indicated in relation to the upstream station.

COW - 015 at LR58026 Bridge, Osceola, Pennsylvania

The water was clear and cold with minnows in abundance at this station. Caddisflies (three kinds) were the dominant bottom organism and comprised 754 of the 882 organisms in the quantitative sample. Mayflies (four kinds) were the second most abundant organism with 77 in the quantitative sample. Sixteen kinds of organisms were collected in the qualitative sample. The biological conditions indicated substantial recovery had occurred, and that good water quality prevailed at this station.

COW - 013 at Pennsylvania Route 49 Bridge Downstream from Elkland, Pennsylvania

Although a few mayflies were found in the qualitative sample at this station, most of the bottom organisms were intermediate and pollution-tolerant forms. The number of kinds was reduced to 12 from 16 upstream, and the number of organisms per square foot was reduced to 19 from 882 upstream. Air-breathing snails, sow-bugs, and leeches were the dominant bottom organisms. Although a few clean-water forms were still present, biological degradation was indicated in relation to the upstream station.

COW - 008 at LR58050 Bridge, Nelson, Pennsylvania

The water at this station was clear and cold. Caddisflies were the predominant organisms in the qualitative sample, other clean-water forms being stoneflies and mayflies. Although the number of kinds had been reduced to nine from 12 upstream, the bottom organism population indicated some improvement in water quality at this station.

COW - 005 at LR58052 Bridge, Tomkins, Pennsylvania

The water was clear at this station, and filamentous green algae, water weed (Elodea), and duckweed were observed. The qualitative sample consisted of 13 kinds of bottom organisms, caddisflies and mayflies being most abundant. Other clean-water forms included stoneflies, fishflies, and water pennies. The biological conditions indicated an improvement in water quality at this station.

COW - 002 at U.S.G.S. Gaging Station one mile west of Lawrenceville, Pennsylvania

The water was very clear and cold, and minnows were easily observed. Heavy growths of filamentous green algae and water weed were also noted. Fourteen kinds of organisms were collected in the qualitative sample, with mayflies being the predominant forms. Other clean-water forms consisted of caddisflies and water pennies. Good water quality was indicated at this station.

COW - 001 Downstream from U. S. Route 15 Bridge at Lawrenceville, Pennsylvania

At this station the number of kinds increased to 20 versus 14 at the upstream station. Caddisflies (three kinds) comprised 202 of the 251 organisms per square foot in the quantitative sample. Mayflies (three kinds) and stoneflies were also abundant. Other clean-water forms included two kinds of riffle beetles. The Cowanesque River contributed good quality water to the Tioga River at mile 57.6.

TIO - 056 Downstream from the New York Route 118 Bridge at Lindley, New York

The water at this location still had a bluish-green tinge of color; however, there was considerably less of the grayish-gelatinous material on the rocks than there was upstream.

The rocks in the area were black on the underside. Bottom organisms still could not be found, apparently the continuing effects of mine drainage.

CAN - 045 at Steuben County Road 30 Bridge, Arkport, New York

The Canisteo River enters the Tioga River at mile 48.7. The water at this location was very clear, and numerous minnows were observed. A yellow flocculant material covered most of the rocks. The qualitative sample indicated the presence of 16 kinds of bottom organisms and included such clean-water forms as mayflies (four kinds), caddisflies (two kinds), and riffle beetles (two kinds). However, only 52 bottom organisms were obtained in the quantitative sample. The biological population indicated unpolluted conditions at this station.

CAN - 042 at Steuben County Road 34 Bridge, Downstream from Arkport, New York

The water at this station was slow moving and very turbid. The bottom was mucky, making it impossible to reach the middle of the stream to take a quantitative sample. Although a few mayflies were collected, only five kinds of bottom organisms could be found versus 16 at the upstream station. Biological degradation had occurred between this station and the one upstream.

CAN - 039 Downstream from River Street Bridge, Hornell, New York

Although 12 kinds of bottom organisms were found at this station, the majority were organic pollution-tolerant forms. Sludgeworms and leeches (three kinds) were abundant. Other organic pollution-tolerant organisms included bloodworms and air-breathing snails. The number of organisms in the quantitative sample was quite high, 13,135 per square foot, of which 12,917 were organic pollution-tolerant sludgeworms. Bloodworms and leeches were also abundant in the quantitative sample. Heavy organic pollution was indicated at this station.

CAN - 036 at County Road 53 Bridge, South Hornell, New York

Only two kinds of bottom organisms could be found at this station. Sludgeworms and air-breathing snails, both organic pollution-tolerant forms, were abundant. The water was extremely turbid, and the sludge deposits along the shore were

literally "alive" with sludgeworms. Heavy organic pollution was indicated at this station.

CAN - 035 one mile Upstream from Canisteo, New York

At this station the water continued to be extremely turbid with a strong sewage odor. All of the rocks were coated with a gray slime, and domestic waste solids were observed. Sludgeworms were extremely abundant; the only other organism found was a species of bloodworm. Heavy organic pollution was still indicated.

CAN - 032 at County Road 40 Bridge, Canisteo, New York

The water continued to be extremely turbid at this station and emitted a sewage odor. Bottom organisms could not be found along the shore, and it was impossible to sample out in the stream because of the undergrowth and mucky swamp conditions along the stream banks. Organic pollution still persisted.

CAN - 031 at County Road 42 Bridge Downstream from Canisteo, New York

The water at this station was still turbid, and a sewage odor was present. Eight kinds of bottom organisms were found, but practically all were organic pollution-tolerant forms. The pollution-tolerant bloodworm was the dominant form and comprised 228 of the 384 organisms per square foot in the quantitative sample. Sludgeworms were the second most abundant forms, comprising 144 organisms in the quantitative sample. Dead fish from a recent fish kill were observed. Polluted conditions still existed.

CAN - 027 at Bridge Crossing in Adrian, New York

The water at this station was clear, and water weed and duckweed were abundant. Moss was also abundant on the rocks. The number of kinds of bottom organisms had increased to 16 from eight at the upstream station; clean-water forms such as caddisflies (two kinds) and mayflies predominated. Caddisflies comprised 46 of the 102 organisms per square foot in the quantitative sample. Other clean-water forms included riffle beetles. Fishermen in the area were observed catching black bullheads, bluegills, and northern creek chubs. Recovery from the upstream condition appeared to be occurring at this point.

CAN - 024 at the New York Route 42 Bridge, Downstream from Adrian, New York

The water at this station was clear with a profuse growth of aquatic plants. Numerous minnows and suckers were observed. The number of kinds of organisms at this station had been reduced to nine from the 16 upstream; however, caddisflies and mayflies were the predominant forms. Good water quality was still indicated.

CAN - 021 at County Road 42 Bridge, Downstream from West Cameron, New York

The qualitative sample contained 11 kinds of organisms, an increase compared to the nine upstream. Mayflies (two kinds) were extremely abundant and were found on every rock. An improvement in water quality was indicated at this station.

CAN - 017 at County Road 84 Bridge, Cameron Mills, New York

Mayflies (two kinds), caddisflies (two kinds), and crayfish were abundant at this station. The number of kinds of bottom organisms increased to 14 over the 11 upstream. Improved biological conditions are indicated. Some nutrient enrichment was suggested by the extremely heavy growths of submerged aquatic plants and filamentous green algae.

CAN - 012 Upstream from County Road 86 Bridge at Rathbone, New York

Because of an impoundment at this station, sampling was confined to the shoreline. Only five kinds of bottom organisms were observed. Good water quality was indicated.

CAN - 006 at New York Route 17 Bridge, Addison, New York

The number of kinds of bottom organisms had increased to nine at this station versus five upstream. Mayflies (two kinds) and caddisflies were abundant. Other clean-water forms included water pennies and hellgrammites. In addition, numerous smallmouth bass were observed. Good water quality was indicated.

CAN - 000 at U. S. Route 15 Bridge, south of Erwins, New York

The number of kinds of bottom organisms increased to 21 at this station from nine upstream. Clean-water forms such as mayflies (three kinds), caddisflies (four kinds), stoneflies, riffle beetles (two kinds), "Unio" mussels, and a species of gill-breathing snails were found. Mayflies and caddisflies were very abundant. Numerous fish including catfish, suckers, and minnows were readily observed. High quality water from the Canisteo River enters the Tioga River at mile 48.7.

TIO - 048 at U.S.G.S. Gaging Station Downstream from Erwins, New York

The water at this station was deep, clear, and slow moving. Although bottom organisms were sparse, 13 kinds were found, with mayflies (two kinds) being the most abundant. Other clean-water forms included caddisflies and riffle beetles. This station exhibited the best biological conditions of the Tioga River, apparently the effect of high quality water entering upstream from the Canisteo River.

COH - 038 at U. S. Route 15 Bridge, Cohocton, New York

The Cohocton River joins the Tioga River at mile 45.1 to form the Chemung River. A total of 16 kinds of bottom organisms were collected at this station, including such clean-water forms as mayflies (four kinds), caddisflies (two kinds), stoneflies, and riffle beetles (two kinds). A total of 176 organisms were collected in the quantitative sample. Mayflies and caddisflies were the predominant forms. The water at this station was clear, and minnows and darters were extremely numerous. A species of madtom, a member of the catfish family, was also collected in the qualitative sample. Good water quality was indicated at this station.

COH - 025 Upstream from U. S. Route 15 Bridge, Kanona, New York

Although the number of kinds of bottom organisms at this station had been reduced to 11 from 16 upstream, caddisflies, mayflies, and stoneflies were abundant. Caddisflies (two kinds) were extremely abundant, comprising 575 of the 670 organisms in the quantitative sample. Mayflies (two kinds), stoneflies, and riffle beetles (two kinds) were also collected in the quantitative sample. The water at this location was clear and cold, and

many white suckers were observed. Excellent biological conditions were indicated.

COH - 018 at County Road 77 Bridge Downstream from Bath, New York

The number of kinds of bottom organisms increased from 11 upstream to 18 at this station. Caddisflies were abundant and comprised 248 of the 512 organisms in the quantitative sample. Other clean-water forms included a gill-breathing snail, a "Unio" mussel, and riffle beetles (two kinds). Good water quality was still present.

COH - 006 at County Road 98, Curtis, New York

The number of kinds of organisms at this station remained at 18, but the number of organisms per square foot increased to 707 from the 512 upstream. Midges and caddisflies were the dominant organisms in the quantitative sample, comprising 622 of the total count. Clean-water forms such as mayflies (two kinds) and water pennies were also sampled. The water was clear at this location and contained heavy growths of aquatic vegetation, suggesting nutrient enrichment. During August 1965, a fish kill occurred in this area. However, at the time of sampling, unpolluted biological conditions were found to exist, and the cause of the fish kill apparently did not affect the bottom organisms.

COH - 001 Upstream from U. S. Route 15 and New York Route 17 Bridge at Painted Post, New York

The number of kinds of bottom organisms had increased to 24 at this station from 18 upstream and included such clean-water forms as mayflies (three kinds), caddisflies (two kinds), stoneflies, hellgrammites, riffle beetles (two kinds), and fishflies. Caddisflies (187) and mayflies (86) were the most abundant forms in the quantitative sample of 380 organisms per square foot. Excellent biological conditions were indicated at this station. The Cohocton River contributed high quality water to the Chemung River at mile 45.1.

CHM - 044 at New York Route 17 Bridge, at the west edge of Corning, New York

This was the most upstream biological station on the Chemung River. The water at this station was very clear with a profuse growth of submerged aquatic plants and filamentous green algae. Smallmouth bass were extremely abundant in the area. Eleven kinds of bottom organisms were collected. Caddisflies

(three kinds), being the most abundant, comprised 83 of the 95 organisms per square foot in the quantitative sample. Other clean-water forms included mayflies (two kinds) and stoneflies. Unpolluted biological conditions were indicated at this station.

CHM - 042 at New York Route 17 Bridge, at the east edge of Corning, New York

The number of kinds of bottom organisms at this station increased to 13 from 11 upstream, and the number of organisms per square foot increased to 147 from 95 upstream. The predominant forms at this station were midge larvae. Caddisflies were still abundant, but mayflies were sparse, and stoneflies could not be found. Some smallmouth bass and rock bass were observed. Unpolluted biological conditions were still indicated.

CHM - 036 at County Road 32 Bridge Upstream from Big Flats, New York

The water at this station was very clear with a profuse growth of filamentous green algae, indicating nutrient enrichment from upstream. A quantitative sample could not be taken because of the absence of riffle areas and a sharp drop-off of the river bottom near the bank. Although one kind of mayfly was found, most of the bottom organisms were intermediate and pollution-tolerant. The number of kinds had decreased from 13 upstream to seven at this station; all were sparse in numbers. Degradation from the upstream station was indicated.

CHM - 030 at County Road 42 Bridge Upstream from West Elmira, New York

The water was clear at this station, and numerous fish were observed. Sampling conditions were very poor due to the lack of riffle areas and the mucky bottom. Only two kinds of bottom organisms could be found, one of which was a pollution-tolerant air-breathing snail. The reduction in number of kinds at this station indicated degraded conditions exist in relation to the upstream station.

CHM - 026 Downstream from Madison Avenue Bridge, Elmira, New York

The number of kinds of organisms at this station increased to 18 from the two at the upstream station. Clean-water forms included mayflies (five kinds) and a gill-breathing snail. Mayflies and midges were abundant. Young smallmouth bass were extremely abundant, and fishermen were observed "reeling in" their catch. Good quality water was indicated at this station.

NEW - 005 at County Road 18 Bridge, Elmira Heights, New York

Newton Creek enters the Chemung River at mile 24.9. The water at this station was cloudy with heavy growths of duckweed and filamentous green algae. A few mayflies were sampled, but the dominant forms were organic pollution-tolerant air-breathing snails and the intermediate sow-bugs. Only six kinds of bottom organisms were found, with the majority being organic pollution-tolerant and intermediate forms. A quantitative sample could not be taken because of steep banks and sharp drop-off of the river bottom. Poor water quality was indicated.

NEW - 000 Downstream from New York Route 17-E Bridge

The water was very cloudy at this station. Only seven kinds of bottom organisms were found in the qualitative sample. Sludgeworms (218) and air-breathing snails (43) were the predominant forms in the quantitative sample which consisted of 330 organisms. Moderate organic pollution was indicated at this station. Newton Creek contributed poor quality water to the Chemung River.

CHM - 019 at New York Route 367 Bridge, Wellsburg, New York

Deep water, due to a sharp drop-off of the river bottom, was experienced at this station. The water was clear, and some smallmouth bass were observed. The number of kinds of bottom organisms decreased from 18 upstream to 14 at this station. Mayflies were sparse, and only one kind could be found. The only other clean-water organisms found were a riffle beetle and a gill-breathing snail; the majority of the organisms were pollution-tolerant and intermediates. Degraded conditions existed in relation to the upstream station.

CHM - 013 at County Road 30 Bridge, southwest of Chemung, New York

The water was very clear at this station and contained heavy growths of submerged aquatic vegetation and filamentous green algae. Eleven kinds of bottom organisms were found at this station versus the 14 upstream. The only clean-water organisms were gill-breathing snails (two kinds). The dominant organisms in the quantitative sample were sludgeworms, comprising 56 of the 71 organisms in the square foot sample. Degraded conditions were indicated compared to the upstream station.

CHM - 005 at LR08066 Bridge, west of Sayre, Pennsylvania

Caddisflies (four kinds) and mayflies (six kinds) were abundant at this station. Other clean-water forms included stoneflies and riffle beetles (two kinds). The number of kinds of bottom organisms increased from 11 upstream to 20 at this station. Caddisflies (158), mayflies (115), and stoneflies (nine) were the predominant forms in the square foot sample which consisted of 514 organisms. Based on the bottom organisms, a great improvement in water quality was indicated at this station. The Chemung River contributed good quality water to the Susquehanna River.

WEST BRANCH SUSQUEHANNA RIVER AND TRIBUTARIES

Main Stem - WBS - 237 at LR11045 Bridge Upstream from Elmora, Pennsylvania

Considerable coal mining activities were occurring in the area of this station. Iron compounds were evident on all of the rocks, and heavy coal fines were observed in the stream. Garbage from homes in the vicinity was mixed with organic sludge deposits on the stream bottom. The stream is quite narrow and shallow in this area. Only a sparse population of organic pollution-tolerant bloodworms could be found. The West Branch of the Susquehanna River was polluted at its headwaters with mine drainage, coal fines, and organic wastes.

Chest Creek Basin - 1 station - enters main stem at mile 205.3

CHS - 001 at LR17002 Bridge, Mahaffey, Pennsylvania

The water was clear at this station, and minnows and darters were abundant. Only nine kinds of bottom organisms were found, but they included such clean-water forms as stoneflies, mayflies (two kinds), caddisflies, and riffle beetles. Only 17 organisms per square foot were obtained in the quantitative sample, consisting of five mayflies, four caddisflies, three beetle larvae, three riffle beetles, one dragonfly, and one stonefly. The pH at this station ranged from 6.0 to 6.5. The acidic water of the West Branch Susquehanna River soon overcame the slightly alkaline water entering from Chest Creek.

Main Stem - WBS - 201 at T418 Bridge Upstream from Curry Run, Pennsylvania

The water was very clear, and heavy iron compounds were observed on the rocks. A few caddisflies and one mayfly were found in one small section of the stream; elsewhere, bottom organisms could not be found. These organisms are believed to be contributed by Chest Creek and were eliminated downstream by the acidic water in the West Branch Susquehanna River. The pH at this station was 4.9 at the time of sampling.

Main Stem - WBS - 185 at Irwin Park near Curwensville, Pennsylvania

The water was clear at this station, and heavy iron compounds were observed on the rocks throughout the area. Bottom organisms could not be found, apparently the effect of mine drainage pollution.

Main Stem - WBS - 174 Downstream from Pennsylvania Route 153 Bridge, Clearfield, Pennsylvania

The stream and biological characteristics at this station were identical to the upstream station, still indicating the presence of mine drainage.

Clearfield Creek Basin - 1 station - enters main stem at mile 171.5

CLR - 001 east of Clearfield, Pennsylvania, 0.5 mile downstream from U. S. Route 322 Bridge

The water was very clear at this station, and heavy iron compounds were observed on the rocks. The pH at time of sampling was 3.8. Only a few beetle larvae and a few midge larvae could be found. Clearfield Creek contributed mine drainage to the West Branch Susquehanna River.

Main Stem - WBS - 163 Downstream from Pennsylvania Route 970 Bridge, Shawville, Pennsylvania

The water was clear at this station, and heavy iron compounds were observed on the rocks. Bottom organisms were absent. Elevated water temperatures, as a result of a steam power plant in the vicinity of Shawville, were observed at this station. Stream data have indicated temperatures as high as 56° C.

Moshannon Creek Basin - 3 stations - enters main stem at mile 135.5

MOS - 034 at Pine Street Bridge, Philipsburg, Pennsylvania

The water was very clear at this station, and heavy iron compounds were observed on the rocks. Sludge deposits and evidence of domestic pollution were present. The only bottom

organism present was an organic pollution-tolerant bloodworm. A specific conductivity of 1,250 (micromhos at 25° C) and a pH as low as 3.2 have been recorded at this location. Mine drainage and organic pollution were indicated at this station.

MOS - 005 Upstream from Pennsylvania Route 53 Bridge and the confluence of Black Moshannon Creek

The water was very clear, and heavy iron compounds were observed on the rocks at this station. Bottom organisms could not be found. Specific conductivities of 1,000 to 1,400 (micromhos at 25° C) and pH readings of 3.1 to 3.5 were recorded at this location. Moshannon Creek contributed mine drainage to the West Branch Susquehanna River.

BLK - 000 at Confluence with Moshannon Creek

Only a few stoneflies could be found at this station on Black Moshannon Creek. The water was clear, and light iron compounds were observed on the rocks. The alkalinity contributed by Black Moshannon Creek was soon overcome by the acidic water of Moshannon Creek.

Main Stem - WBS - 132 at Pennsylvania Route 879 Bridge, Karthaus, Pennsylvania

Again at this station the water was clear with heavy iron compounds noticeable on the rocks. Specific conductivity readings of 300 to 1,190 (micromhos at 25° C) and pH readings of 3.2 to 4.4 were recorded at this location. Bottom organisms could not be found. Mine drainage continued to exert adverse effects at this station.

Mosquito Creek Basin - 1 station - enters main stem at mile 132.2

MOQ - 000 Downstream from Pennsylvania Route 879 Bridge near Karthaus, Pennsylvania

The water was clear at this station, and light iron compounds were noticed on the rocks. Only a few stoneflies could be found. The alkalinity contributed by Mosquito Creek was soon overcome by the acidic water of the West Branch Susquehanna River.

Sinnemahoning Creek Basin* - 6 stations - enters main stem at mile 110.2

* The Driftwood Branch of Sinnemahoning Creek and Bennett Branch join to form the main stem of the Sinnemahoning Creek. The Driftwood Branch is considered the main stem and is, therefore, indexed as a continuation of Sinnemahoning Creek.

DBS - 035 at Emporium, Pennsylvania

The Driftwood Branch of Sinnemahoning Creek was sampled immediately upstream from the Sinnemahoning-Portage Creek confluence. Only five kinds of organisms were found in the qualitative sample and consisted of a few water pennies, limpets, crayfish, and air-breathing snails. This station was sampled on October 12, 1965. On August 29, 1965, there was a fish kill due to a fuel oil spill at Emporium and may be the reason for the sparse bottom organism population. Driftwood Branch has a low alkalinity reserve and, consequently, rather unstable biological conditions prevail.

SPC - 000 Upstream from the mouth at Emporium, Pennsylvania

Sinnemahoning-Portage Creek was sampled about 50 yards upstream from its mouth. The water was very clear at this station, and numerous minnows were observed. Only three kinds of bottom organisms were found; these consisted of caddisflies, air-breathing snails, and bloodworms. A quantitative sample was not taken because of the sparse organism population. The forms of organisms suggested that Sinnemahoning-Portage Creek contributed slightly better quality water to the Driftwood Branch than that found at the upstream station on Driftwood Branch.

DBS - 016 at Pennsylvania Route 555 Bridge, Driftwood, Pennsylvania

The water was clear at this station, and some suckers, minnows, and a few sunfish were observed. Bottom organisms were sparse, and only six kinds were found, including such clean-water forms as mayflies, caddisflies, and water pennies. Air-breathing snails were the dominant forms. Driftwood Branch has a low alkalinity reserve and is subject to occasional mine drainage pollution downstream from Sterling Run. Unstable chemical conditions in the stream are presumably responsible for the poor bottom organism population at this station.

BBS - 000 Upstream from Driftwood Branch at Driftwood, Pennsylvania

Bennett Branch of Sinnemahoning Creek was sampled about 200 yards upstream from the confluence with Driftwood Branch. Very heavy iron compounds were found on all of the rocks at this station. Bottom organisms could not be found. Specific conductivity readings of 275 to 750 (micromhos at 25° C) and pH readings of 3.4 to 4.0 were recorded at this station. Bennett Branch contributed mine drainage to Sinnemahoning Creek.

FFS - 000 Near Pennsylvania Route 872, Upstream from U. S. Route 120

This station on the First Fork of Sinnemahoning Creek was located about 0.4 mile upstream from the mouth. The water was clear, and deer were observed drinking from the stream. The specific conductivity readings ranged from 75 to 120 (micromhos at 25° C) and pH readings ranged from 6.0 to 6.5 at this station. Only seven kinds of bottom organisms were found; these included such clean-water forms as water pennies and an abundance of mayflies (three kinds) and caddisflies (two kinds). The quantitative sample consisted of 11 mayflies and two water pennies. The low number of organisms in the square foot sample was attributed to the large rocks which reduced the effectiveness of the sampler. The First Fork contributed high quality water to Sinnemahoning Creek.

SIN - 000 Downstream from the Bridge at Keating, Pennsylvania

This station was the most downstream sampling location on Sinnemahoning Creek. The water was very clear at this location, and iron compounds were observed on all the rocks. Specific conductivity readings ranged from 95 to 410 (micromhos at 25° C), and pH readings ranged from 4.3 to 6.5. Bottom organisms could not be found. Sinnemahoning Creek contributed mine drainage pollution to the West Branch.

Main Stem - WBS - 105 at Westport, Pennsylvania

The water was clear, and iron compounds were noticed on all of the rocks at this station. A few midge larvae could be found, but because of sparse populations, a quantitative sample was not taken. Mine drainage still exerted an adverse effect on the biological habitat.

Kettle Creek Basin - 5 stations - enters main stem at mile 104.1

KET - 006 near LR18003, Upstream from Westport, Pennsylvania

The water was quite clear at this station. Thirteen kinds of bottom organisms were collected, including clean-water forms such as stoneflies, mayflies (four kinds), and caddisflies (two kinds). Sixty-two organisms were collected in the square foot sample which consisted of mayflies (48), aquatic earthworms (six), stoneflies (five), dragonflies (two), and a midge. Other bottom organisms found at this station were crayfish and damselflies. Fishermen were observed in the area at the time of sampling. Unpolluted biological conditions are indicated at this location.

KET - 004 at U.S.G.S. Gaging Station Upstream from Westport, Pennsylvania

A green gelatinous growth covered the rocks on the west side, while on the east side the gel was brown and dead. On the east side, iron compounds were observed upstream on the rocks, and some foaming was observed at the surface of the water. Nine kinds of bottom organisms were found and included clean-water forms such as stoneflies, mayflies (two kinds), caddisflies (two kinds), and riffle beetles. Bottom organisms were very sparse; therefore, a quantitative sample was not taken. Acidic water appeared to be leaching into the stream from the east bank. The acidic water apparently was the reason for the reduction in bottom organisms from 13 kinds upstream to nine kinds at this location. This station exhibited biological degradation in relation to the upstream station.

KET - 002 Upstream from Two Mile Run

At this station the rocks were coated with iron compounds and dead moss. Bottom organisms could not be found.

TWO - 000 at LR18003 Bridge Upstream from Westport, Pennsylvania

Two Mile Run was sampled at its mouth immediately upstream from the confluence with Kettle Creek at mile 1.75. Iron compounds were heavy on the rocks at this station, and the pH was 4.2. Bottom organisms could not be found. Two Mile Run contributed mine drainage to Kettle Creek.

KET - 000 at U. S. Route 120 Bridge, Westport, Pennsylvania

The water was very clear with heavy iron compounds observed on all of the rocks at this station. Bottom organisms could not be found. Kettle Creek contributes mine drainage to the West Branch Susquehanna River.

Main Stem - WBS - 104 Downstream from Kettle Creek

The water was very clear at this station, and heavy iron compounds were observed on the rocks. Bottom organisms could not be found. Mine drainage was indicated.

Main Stem - WBS - 098 at Pennsylvania Route 144 Bridge, Renovo, Pennsylvania

The water was clear, and heavy iron compounds were present on all of the rocks at this station. Numerous children were observed swimming in the area. Conductivity readings of 275 to 940 (micromhos at 25° C) and pH readings of 3.4 to 4.0 were recorded at this location. Only a few sludgeworms were found. Mine drainage was still indicated at this station.

Main Stem - WBS - 070 at Pennsylvania Route 664 Bridge, Lock Haven, Pennsylvania

The water was quite deep at this station due to impounded conditions created by the dam downstream. Heavy swimming and boating were observed at this location. Outfalls from private homes were noted, and domestic waste solids were observed throughout the area. Because of the river depth, sampling had to be confined to the bank. Only organic pollution-tolerant bloodworms and sludgeworms, and sow-bugs were found at this station. The quantitative sample contained sludgeworms (507), bloodworms (256), and a sow-bug. The pH at this station is usually 4.5 or lower. Organic pollution and mine drainage were indicated.

North Bald Eagle Creek Basin - 18 stations - enters main stem at mile 67.7

SPN - 015 at FAS-871 Bridge, Oak Hall, Pennsylvania

Spring Creek is a tributary which enters North Bald Eagle Creek at mile 28.1. The water was clear at this station. Thirteen kinds of bottom organisms were found, including such clean-water forms as stoneflies, mayflies (two kinds), and caddisflies (three kinds). The sow-bug was the dominant organism in the quantitative sample. Unpolluted biological conditions were indicated.

SPN - 013 at LR14039 Bridge Downstream from Lemont, Pennsylvania

The water was murky at this station. Aquatic vegetation such as water weed, pondweed, and filamentous green algae were abundant. Only three kinds of bottom organisms were found versus 13 at the upstream station. An enormous sow-bug population was found. Scuds and flatworms were the other two organisms found. Definite degradation was indicated in relation to the upstream station.

SLB - 002 at LR14019 Bridge, Lemont, Pennsylvania

Slab Cabin Run is a tributary entering Spring Creek at mile 11. Seven kinds of bottom organisms were collected at this station and consisted of such clean-water forms as mayflies, caddisflies, and riffle beetles. Good water quality was indicated at this station.

THM - 001 Downstream from Pennsylvania Route 26 Bridge and State College, Pennsylvania

Thompson Run, which enters Slab Cabin Run at mile 0.5, receives the sewage treatment plant effluent from the Borough of State College. The water at this station was slightly murky. Aquatic vegetation was abundant, indicating high nutrient enrichment from upstream. Only six kinds of bottom organisms were sampled, and all were organic pollution-tolerant and intermediate forms. Sludgeworms (634) and bloodworms (62) were the dominant forms in the square foot sample totaling 703 organisms. Other forms collected included blackflies, an aquatic earthworm, and air-breathing snails. Degraded conditions were indicated at this station.

SLB - 000 at LR14039 Bridge, Downstream from Lemont, Pennsylvania

The water at this station was murky. Curly-leaf pondweed (Potamogeton crispus) was very abundant. The bottom was also silty at this location. Only five kinds of bottom organisms were found, and all were organic pollution-tolerant and intermediate forms. Air-breathing snails were the dominant form. Slab Cabin Run has experienced low dissolved oxygen readings for samples taken at night. Degraded conditions were still indicated.

SPN - 010 at LR14039 Bridge, Houserville, Pennsylvania

The water was murky at this station, and the bottom was soft with silt. Water weed was present but was not as profuse as upstream. Only five kinds of bottom organisms were found, and all were organic pollution-tolerant and intermediate forms. Air-breathing snails were the dominant form. Degraded conditions were indicated.

SPN - 004 at LR14040 Bridge between U.S.G.S. Gaging Station and Fishermen's Paradise

The water at this station was clear, and numerous minnows were observed. Sow-bugs and crayfish were the dominant forms in the sample. The only other bottom organism found was an air-breathing snail. Mild degradation was still indicated in relation to the upstream stations.

SPN - 003 at Pennsylvania Route 550 Bridge Upstream from Bellefonte, Pennsylvania

The water was clear at this station. Aquatic plants such as water weed, curly-leaf pondweed, and algae were present. Sow-bugs were the dominant bottom organisms. Other bottom organisms found were crayfish, air-breathing snails, blackflies, and flatworms. Mild degradation from upstream was still indicated.

LOG - 003 at Pennsylvania Route 52, Upstream from Bellefonte, Pennsylvania

Logan Creek, a tributary to Spring Creek, was sampled upstream from the Cerro Copper and Brass Plant at Bellefonte. The water at this station was very clear, and aquatic plants were observed. The plants included curly-leaf pondweed, water cress, a moss, and some filamentous green algae. Nine kinds of bottom organisms were found, including such clean-water forms as

mayflies (two kinds), caddisflies (two kinds), and riffle beetles. A sculpin (Cottus) was collected in the qualitative sample. An enormous population of scuds was present, comprising 274 of the 556 organisms in the quantitative sample. Caddisflies (125), riffle beetles (83), sow-bugs (34), mayflies (20), blackflies (11), and air-breathing snails were the other organisms in the square foot sample. Numerous fish were also observed. High water quality was indicated at this station.

LOG - 001 between Cerro Copper and Brass Plant and Pennsylvania Routes 26 and 550, Bellefonte, Pennsylvania

The water was clear at this station, and some moss was observed on the rocks. Bottom organisms were very sparse, and only a few flatworms and a couple of midge larvae could be found. A quantitative sample was not taken because of the sparse organism population. Degraded conditions were indicated. Logan Creek contributed poor quality water to Spring Creek.

SPN - 002 at Old Bridge Abutments on T438 west of Pennsylvania Route 53, Downstream from Bellefonte, Pennsylvania

At this station the water was slightly murky, but pondweeds, moss, and filamentous green algae were present. Only seven kinds of bottom organisms were present, and all were organic pollution-tolerant and intermediate forms. Sludgeworms were abundant; however, the dominant organism was a midge larva which made up 128 of the 134 organisms in the quantitative sample. Leeches, air-breathing snails, fingernail clams, crayfish, and flatworms were the other organisms collected. Numerous minnows were also observed throughout the area. Mild degradation from upstream was indicated.

SPN - 000 west of Junction of Pennsylvania Route 53 and U. S. Route 220 Upstream from Milesburg, Pennsylvania

The water was clear at this station, and numerous minnows were observed. Bottom organisms were not abundant, and only five kinds were found. A few crayfish were also found in the quantitative sample. Bloodworms and midge larvae were the dominant forms and comprised 64 of the 79 organisms in the square foot sample. Sludgeworms (13) and riffle beetles (two) were the other organisms in the square foot sample. Spring Creek contributed mild pollution to North Bald Eagle Creek at mile 28.1.

NBE - 029 at Milesburg, Pennsylvania

North Bald Eagle Creek was first sampled approximately 0.25 mile upstream from the confluence of Spring Creek. The water was very clear at this station, and numerous minnows and smallmouth bass were observed. Children were observed bathing downstream. Seventeen kinds of bottom organisms were collected in the qualitative sample and included such clean-water forms as stoneflies, mayflies (five kinds), hellgrammites, caddisflies (three kinds), and riffle beetles (two kinds). A quantitative sample exhibited an excellent diversification with 13 kinds represented in the square foot sample of 445 organisms. By groups, the quantitative sample consisted of caddisflies (334), mayflies (92), riffle beetles (11), flatworms (three), hellgrammites (three), a stonefly, and a midge. Excellent water quality was indicated.

NBE - 028 at Milesburg, Pennsylvania, about 0.2 mile Downstream from Spring Creek

The flow of North Bald Eagle Creek at this station is substantially increased by the incoming flow of Spring Creek about 0.1 mile upstream. The water was clear, and numerous minnows were observed. A sparse population of only five kinds of bottom organisms was found at this location. These organisms consisted of sludgeworms, midge larvae, sow-bugs, fingernail clams, and crayfish. The mild pollutional load contributed upstream by Spring Creek apparently lowers the quality of water in North Bald Eagle Creek.

NBE - 018 Downstream from LR14012 Bridge near Howard, Pennsylvania

The water at this station was slightly murky, and dead algae were observed on the rocks. The number of kinds of bottom organisms increased to eight versus five upstream. The only clean-water forms were a stonefly, a riffle beetle, and a gill-breathing snail. Sow-bugs and crayfish were the dominant organisms present. Only 23 organisms per square foot were collected in the quantitative sample, which consisted of midge larvae (seven), riffle beetles (six), air-breathing snails (four), sow-bugs (three), crayfish (two), and a gill-breathing snail. Recovery appeared to be taking place at this station.

BEE - 002 at Beech Creek, Pennsylvania, about 0.24 mile Downstream from U. S. Route 220 Bridge

The water at this Beech Creek station was very clear, and heavy iron compounds were observed on the rocks. Bottom organisms were very sparse, and only two hellgrammites and one beetle larva were found in about one-half hour of sampling. A quantitative sample was not taken because of the sparse organism population. Mine drainage was indicated. Beech Creek contributes poor quality water to North Bald Eagle Creek.

NBE - 002 at Castanea, Pennsylvania, about 0.25 mile Downstream from LR18013 Bridge

Downstream from the bridge on the north side of the creek, an outfall emptied raw sewage into the stream. Sludge deposits were heavy below this outfall and contained an abundant population of sludgeworms. The water in the vicinity of this outfall has a heavy floc and contained blood in addition to domestic wastes. Gross organic pollution was indicated at this point.

The station is located at a riffle area approximately 0.25 mile downstream from the outfall. The water at this location was considerably clearer, and 23 kinds of bottom organisms were found. These organisms consisted of such clean-water forms as mayflies (three kinds), caddisflies (two kinds), riffle beetles, and gill-breathing snails (three kinds). However, the dominant forms were organic pollution-tolerant and intermediates, consisting of sludgeworms and sow-bugs. Only 27 organisms were collected in the square foot sample, 18 of which were sludgeworms. North Bald Eagle Creek contributed a mild organic pollution to the West Branch Susquehanna River at mile 67.7.

PIN - 001 Upstream from U. S. Route 220 Bridge, west of Jersey Shore, Pennsylvania

The water at this Pine Creek station was very clear, and numerous smallmouth bass were observed in the area. Swimmers were also noted downstream from the bridge. There appeared to have been a light fish kill less than a week prior to sampling. Practically all of the dead fish observed were redhorse suckers. Fourteen kinds of bottom organisms were collected, including such clean-water forms as mayflies (three kinds) and caddisflies (four kinds). Although mayflies and caddisflies were abundant, only three organisms were collected in the square foot sample. The low number of organisms in the quantitative sample can be attributed to the very large rocks which made sampling difficult. This stream contributed high quality water to the West Branch Susquehanna River at mile 57.6

Main Stem - WBS - 056 Upstream from Pennsylvania Route 44 Bridge, Jersey Shore, Pennsylvania

The water at this station was clear, and an abundant growth of aquatic vegetation was observed. Nine kinds of bottom organisms were found versus three at the upstream station. A few mayflies were collected at this station; however, the dominant organisms were sludgeworms, comprising 49 of the 67 organisms collected in the quantitative sample. The other organisms collected at this station consisted of aquatic earthworms (nine), smoky alderflies, midge larvae (four), a sow-bug, a dragonfly nymph, air-breathing snails, and a beetle larva. This station exhibited definite biological improvement over the upstream station at Lock Haven; however, moderate biological degradation was still indicated.

Lycoming Creek Basin - 2 stations - enters main stem at mile 41.3

LYC - 007 at U. S. Route 15 Bridge, Hepburnville, Pennsylvania

The water at this station was very clear and cold. Eighteen kinds of bottom organisms were collected, consisting of such clean-water forms as stoneflies (two kinds), mayflies (five kinds), caddisflies (four kinds), hellgrammites, fishflies, and riffle beetles. Only 45 organisms were collected in the square foot sample; however, these were clean-water forms such as mayflies (16), caddisflies (ten), stoneflies (four), fishflies (three), and a riffle beetle. Unpolluted biological conditions were indicated at this station.

LYC - 001 Upstream from U. S. Route 220 Bridge, Williamsport, Pennsylvania

The water at this station was very clear, and numerous minnows and darters were observed. Fourteen kinds of bottom organisms were collected, including such clean-water forms as mayflies (four kinds), caddisflies (three kinds), and water pennies. Although there has been a slight drop in water quality from the upstream station, unpolluted conditions are still indicated. Lycoming Creek contributed high quality water to the West Branch Susquehanna River at mile 41.3.

Main Stem - WBS - 040 Upstream from Maynard Street Bridge, Williamsport, Pennsylvania

The water was murky at this station, and sludge deposits were observed near the bank. Schools of carp and minnows were observed in the area. Sampling had to be confined to the shallow water along the bank due to the sludge deposits and a sharp drop-off of the river bottom further out in the stream. Only nine kinds of bottom organisms were found; all except one kind were organic pollution-tolerant or intermediate forms. Sludgeworms were the dominant forms and comprised 176 of the 185 organisms collected in the quantitative sample. Organic pollution from upstream was indicated.

Loyalsock Creek Basin - 1 station - enters main stem at mile 35.2

LYO - 002 at U. S. Route 220 Bridge, Montoursville, Pennsylvania

The water at this Loyalsock Creek station was clear, and numerous suckers and minnows were observed. An aquatic plant and light growths of filamentous green algae were present. Twenty-one kinds of bottom organisms were collected at this location, including such clean-water forms as stoneflies (three kinds), mayflies (five kinds), caddisflies (five kinds), hellgrammites, and riffle beetles. The 331 bottom organisms in the quantitative sample consisted of caddisflies (84), riffle beetles (84), mayflies (79), stoneflies (15), and a hellgrammite. This station exhibited the most favorable biological population in the West Branch Susquehanna River Basin. Loyalsock Creek contributed excellent water quality to the West Branch Susquehanna River at mile 35.2.

Muncy Creek Basin - 1 station - enters main stem at mile 27.8

MUN - 001 at Pennsylvania Route 147 Bridge north of Muncy, Pennsylvania

The water at this station was clear, and minnows and sunfish were easily observed. Only 11 kinds of bottom organisms were collected; however, nine kinds were clean-water forms and consisted of stoneflies, mayflies (four kinds), caddisflies (two kinds), and riffle beetles (two kinds). The quantitative sample contained mayflies (179), caddisflies (25), blackflies (13), and

riffle beetles (four). Muncy Creek contributed high quality water to the West Branch Susquehanna River at mile 27.8.

Main Stem - WBS - 023 at Montgomery Park Downstream from Pennsylvania Routes 54 and 405 Bridge, Montgomery, Pennsylvania

The water was very clear at this station and was being used for swimming at the Park. Minnows were observed throughout the water. Sparse numbers of only two kinds of bottom organisms could be found; thus, a quantitative sample was not taken. The organisms found consisted of sow-bugs and caddisflies. The station indicated degraded conditions from upstream. This area experienced two fish kills from "acid slugs" upstream during 1964.

Main Stem - WBS - 016 Downstream from Bridge Crossing at Watsontown, Pennsylvania

The water was very clear, and some pondweed was observed at this station. A few bullheads and numerous minnows were noted in the water. Sparse populations of only seven kinds of bottom organisms could be found; these consisted of caddisflies (three kinds), midge larvae (two kinds), mayflies, and flatworms. A quantitative sample was not taken because of the sparse number of organisms. Mild degraded conditions from upstream were still indicated. The area experienced two fish kills in 1964, one of which was a major kill. These kills were caused by "acid slugs" from upstream.

Main Stem - WBS - 012 (E. B.) Upstream from Pennsylvania Route 642 Bridge at Milton, Pennsylvania

This station was located approximately one-third of the way across the river from the east bank. The water was clear, and minnows were abundant. Only seven kinds of bottom organisms were found which consisted of caddisflies (two kinds), mayflies, water pennies, blackflies, scuds, and a midge larva. The dominant forms were blackflies which comprised 57 of the 62 organisms in the square foot sample. The sparse population of bottom organisms, excluding the blackflies, was believed to be the result of "acid slugs" from upstream which affect this area once or twice a year.

Main Stem - WBS - 012 (W. B.) Upstream from Pennsylvania Route 642 Bridge on West Milton, Pennsylvania, side

This station was located about one-third of the way across the river from the west bank. The water was clear, and some minnows were observed. Numerous swimmers were observed at the park on an island in the middle of the river. Nine kinds of bottom organisms were collected, including blackflies, caddisflies (three kinds), mayflies, riffle beetles, midge larvae (two kinds), and sludgeworms. Blackflies were the dominant organisms and comprised 181 of the 344 organisms in the square foot sample. Other organisms collected in the quantitative sample were caddisflies (99), riffle beetles (28), midge larvae (17), a mayfly, and a sludgeworm. Improved biological conditions over the upstream station were indicated. The improvement probably can be attributed to two small high quality streams. White Deer Creek and White Deer Hole Creek, which enter from the west bank upstream from this station. Mild degradation, however, was still indicated.

Main Stem - WBS - 008 (E. B.) Downstream from Pennsylvania Route 45 Bridge Opposite Lewisburg, Pennsylvania

This station was located about one-third of the way across the river from the east bank. Some floc was observed in the water, and blue-green algae were observed on the rocks at this station. Upstream, in the vicinity of the bridge, sludge deposits were observed near the bank. Numerous minnows were observed in the riffle area at the sampling station. Only six kinds of bottom organisms could be found, and, except for a few mayflies and caddisflies, were predominately pollution-tolerant organisms. Bloodworms comprised 160 of the 192 organisms in the square foot sample. Other organisms found were leeches, sludgeworms, and blackflies. Mild organic pollution was indicated at this station.

Main Stem - WBS - 008 (W. B.) Downstream from Pennsylvania Route 45 Bridge, Lewisburg, Pennsylvania

This station was located about one-third of the way across the river from the west bank. The water was very clear, and large numbers of minnows were observed. Bullheads, green sunfish, darters, and suckers were also observed. This fish population was the most abundant observed at any station on the main stem of the West Branch Susquehanna River. Some filamentous green algae, primarily Hydrodictyon, and moss were observed on the rocks.

Fifteen kinds of bottom organisms were found at this station and included such clean-water forms as mayflies (three kinds) and caddisflies (two kinds). Caddisflies (101), mayflies (100), midge larvae (39), and blackflies (24) were the dominant forms of the 278 organisms collected in the square foot sample. Unpolluted biological conditions were indicated at this station. The improvement over the upstream station can be attributed partially to the high quality water from Buffalo Creek which enters the West Branch Susquehanna River at mile 7.8.

Main Stem - WBS - 000 (E. B.) at U. S. Route 11 Bridge, Northumberland, Pennsylvania

This station was located approximately one-third of the way across the river from the east bank. The water was very clear at this station. Aquatic plants (water weed and pondweed), numerous minnows, and a few carp and sunfish were observed. Only four kinds of bottom organisms were collected, and these consisted of mayflies, caddisflies, midge larvae, and sludgeworms. Only 11 organisms were collected in the square foot sample. The small diversification in kinds of bottom organisms and low productivity were believed to be due to the unstable water quality conditions that were experienced at this station one or more times annually in recent years. This reach is subject to "acid slug" conditions which originate in the upstream reaches and affect the river as far downstream as Northumberland or Selinsgrove on the main stem.

Main Stem - WBS - 000 (W. B.) at U. S. Route 11 Bridge, Opposite Northumberland, Pennsylvania

This station was located about one-third of the way across the river from the west bank. The water was very clear at this station, and numerous minnows and smallmouth bass were observed. Fishermen were also noticed in the area. Eight kinds of bottom organisms were collected, consisting of mayflies (four kinds), caddisflies, bloodworms, midge larvae, and smoky alderfly larvae. Only 66 bottom organisms per square foot were collected; these were bloodworms (39), midge larvae (22), smoky alderflies (three), and mayflies (two). This station exhibited a substantial reduction in kinds (eight versus 15 upstream). The bottom organism population at this station has been affected by the "acid slugs" which originate in the upstream reaches and have reached this area one or more times annually in recent years. The West Branch Susquehanna River contributed very little toward the improvement of water quality in the Susquehanna River.

TABLE I

BOTTOM ORGANISM DATA

SUSQUEHANNA RIVER AND TRIBUTARIES

Station Location	Station Code	River Mile	Bottom Organisms Number of Kinds	Bottom Organisms Number Per Square Foot
Susquehanna River				
at Cooperstown, N. Y.	SUQ-447	447	10	606
near Emmons, N. Y.	SUQ-421	421.3	21	276
at Oneonta, N. Y.	SUQ-418	417.9	16	165
upstream from Unadilla, N. Y.	SUQ-399	399	22	90
Unadilla River	UND-001	392.4 - 1.0	14	24
Susquehanna River				
at Bainbridge, N. Y.	SUQ-388	388.3	18	725
at Afton, N. Y.	SUQ-382	382.1	24	64
at Windsor, N. Y.	SUQ-363	362.7	18	536
between Oakland and Susquehanna, Pa.	SUQ-352	352	13	---*
at Hallstead, Pa.	SUQ-344	344	16	231
at Conklin, N. Y.	SUQ-337	337	12	60
Chenango River		327.6		
Payne Brook	PAY-005	327.6 - 82.9 - 5.0	14	176
Unnamed Tributary to Payne Brook	UWP-002	327.6 - 82.9 - 3.0 - 2.0	9	---*
Payne Brook	PAY-001	327.6 - 82.9 - 1.0	10	351*
Chenango River	CHA-070	327.6 - 70.0	9	---*
Chenango River	CHA-063	327.6 - 63.0	13	---*
Chenango River	CHA-057	327.6 - 57.1	10	---*
Chenango River	CHA-052	327.6 - 51.5	8	---*
Chenango River	CHA-039	327.6 - 39.2	6	---*
Chenango River	CHA-022	327.6 - 22.0	12	---
Chenango River	CHA-014	327.6 - 14.2	25	646
Tioughnioga River	TOG-036	327.6 - 13.7 - 36.2	21	58
West Branch Tioughnioga River	WBT-004	327.6 - 13.7 - 34.7 - 4.0	18	435
Tioughnioga River	TOG-033	327.6 - 13.7 - 33.8	14	66
Tioughnioga River	TOG-031	327.6 - 13.7 - 31.0	12	457
Tioughnioga River	TOG-025	327.6 - 13.7 - 25.3	15	134*
Tioughnioga River	TOG-020	327.6 - 13.7 - 20.4	17	---

TABLE I (Continued)

Station Location	Station Code	River Mile	Bottom Organisms Number of Kinds	Bottom Organisms Number Per Square Foot
Tioughnioga River	TOG-013	327.6 - 13.7 - 13.0	17	155
Otselic River	OST-006	327.6 - 13.7 - 9.6 - 6.0	17	502
Tioughnioga River	TOG-000	327.6 - 13.0 - 0	13	42*
Chenango River	CHA-006	327.6 - 6.0	16	---
Chenango River	CHA-000	327.6 - 0.4	10	141
Susquehanna River at Johnson City, N. Y. (E. B.)	SUQ-325	324.5	5	---*
at Johnson City, N. Y. (W. B.)	SUQ-325	324.5	21	57
at Endicott, N. Y. (W. B.)	SUQ-319	319	2	---*
at Endicott, N. Y. (W. B.)	SUQ-318	318.4	1	---*
at Vestal, N. Y. (E. B.)	SUQ-317	317	18	115
at Apalachin, N. Y.	SUQ-313	313.4	14	53
at Owego, N. Y.	SUQ-305	304.6	17	492
at Smithboro, N. Y.	SUQ-295	295	22	872*
at Sayre, Pa.	SUQ-286	286	9	---
Chemung River		281.6	(See Table II)	
Susquehanna River at Ulster, Pa.	SUQ-276	276.3	14	---*
at Towanda, Pa.	SUQ-269	268.8	14	---*
Towanda Creek	TOW-001	267.5 - 1.0	12	---
Susquehanna River at Durrell, Pa.	SUQ-261	261.2	12	---*
at Wyalusing, Pa.	SUQ-249	248.7	21	---*
at Mehoopany, Pa.	SUQ-228	228.4	16	---*
Tunkhannock Creek	TUK-001	216.5 - 1.0	13	---
Susquehanna River at Falls, Pa.	SUQ-206	205.8	28	---*
at Coxton Railroad Bridge	SUQ-196	196.2	10	---*
Lackawanna River	LAK-044	195.4 - 44.0	20	191*
Lackawanna River	LAK-041	195.4 - 41.0	8	---

TABLE I (Continued)

Station Location	Station Code	River Mile	Bottom Organisms Number Of Kinds	Bottom Organisms Number Per Square Foot
Lackawanna River	LAK-039	195.4 - 39.4	7	---*
Lackawanna River	LAK-031	195.4 - 31.0	10	---
Lackawanna River	LAK-027	195.4 - 27.1	3	32,895
Lackawanna River	LAK-023	195.4 - 22.7	4	35
Lackawanna River	LAK-018	195.4 - 17.9	3	96
Lackawanna River	LAK-013	195.4 - 12.8	3	95,642
Lackawanna River	LAK-005	195.4 - 4.5	3	6,398
Lackawanna River	LAK-003	195.4 - 3.3	1	12,865
Lackawanna River	LAK-001	195.4 - 0.9	2	562
Susquehanna River at Pittston, Pa. (E. B.)	SUQ-194	194	10	---*
at West Pittston, Pa. (W. B.)	SUQ-194	194	14	235
at Wyoming, Pa. (E. B.)	SUQ-192	192	6	---*
at Wilkes-Barre, Pa. (E. B.)	SUQ-186	186.2	7	88
at Kingston, Pa. (W. B.)	SUQ-186	186.2	13	14
at Iona, Pa. (E. B.)	SUQ-184	184	5	101
at Plymouth, Pa. (W. B.)	SUQ-184	184	9	---*
Solomon's Creek	SOL-001	182.2 - 1.0	0	0
Warrior Run	WAR-001	180.8 - 1.0	0	0
Susquehanna River at Nanticoke, Pa. (E. B.)	SUQ-179	178.9	2	---*
at Retreat State Hospital (E. B.)	SUQ-174	173.7	6	---*
at Shickshinny, Pa. (W. B.)	SUQ-169	169	5	---*
Wapwallopen Creek	WAP-019	164.4 - 19.0	9	---
Wapwallopen Creek	WAP-000	164.4 - 0	20	210
Susquehanna River at Nescopeck, Pa. (E. B.)	SUQ-159	159.1	14	358
at Berwick, Pa. (W. B.)	SUQ-159	159.1	8	355

TABLE I (Continued)

Station Location	Station Code	River Mile	Bottom Organisms Number Of Kinds	Number Per Square Foot
Nescopeck Creek	NES-039	158.9 - 39.0	7	---*
Nescopeck Creek	NES-023	158.9 - 23.0	8	---
Little Nescopeck Creek	NLN-001	158.9 - 18.0 - 1.0	0	0
Nescopeck Creek	NES-018	158.9 - 18.0	0	0
Nescopeck Creek	NES-001	158.9 - 1.0	3	116
Susquehanna River at Mifflinville, Pa. (E. B.)	SUQ-155	154.5	5	---*
at Bloomsburg, Pa. (W. B.)	SUQ-147	147.2	2	---*
Fishing Creek	FIS-000	145.4 - 0	8	8
Susquehanna River at Catawissa, Pa. (E. B.)	SUQ-144	143.6	7	156
at Catawissa, Pa. (W. B.)	SUQ-144	143.6	5	27*
Catawissa Creek	CTW-031	143.5 - 31.0	1	---*
Catawissa Creek	CTW-024	143.5 - 24.0	1	---*
Catawissa Creek	CTW-007	143.5 - 7.0	2	---
Catawissa Creek	CTW-000	143.5 - 0	3	14
Susquehanna River at Riverside, Pa. (E. B.)	SUQ-135	135	4	46
at Danville, Pa. (W. B.)	SUQ-135	135	4	114
at Northumberland, Pa. (E. B.)	SUQ-124	123.7	12	61
at Northumberland, Pa. (Middle)	SUQ-124	123.7	12	398
at Northumberland, Pa. (W. B.)	SUQ-124	123.7	10	372

TABLE II

BOTTOM ORGANISM DATA

CHEMUNG RIVER AND TRIBUTARIES

Station Location	Station Code	River Mile	Bottom Organisms Number Of Kinds	Number Per Square Foot
Tioga River	TIO-088	281.6 - 88.0	5	---*
Morris Run	MOR-001	281.6 - 86.2 - 0.6	1	946
Tioga River	TIO-087	281.6 - 86.5	0	0*
Tioga River	TIO-085	281.6 - 85.0	1	---*
Tioga River	TIO-080	281.6 - 80.0	0	0
Tioga River	TIO-079	281.6 - 79.0	0	0*
Tioga River	TIO-072	281.6 - 72.1	2	---*
Tioga River	TIO-067	281.6 - 66.8	0	0
Tioga River	TIO-066	281.6 - 66.0	0	0*
Crooked Creek	CRK-001	281.6 - 65.2 - 1.0	2	---*
Crooked Creek	CRK-000	281.6 - 65.2 - 0	4	---*
Tioga River	TIO-065	281.6 - 65.0	0	0
Tioga River	TIO-061	281.6 - 60.9	0	0
Tioga River	TIO-059	281.6 - 58.8	0	0
Cowanesque River	COW-027	281.6 - 57.6 - 26.5	14	1,343
Cowanesque River	COW-023	281.6 - 57.6 - 23.0	10	61
Cowanesque River	COW-015	281.6 - 57.6 - 14.0	16	882
Cowanesque River	COW-013	281.6 - 57.6 - 13.0	12	19*
Cowanesque River	COW-008	281.6 - 57.6 - 7.6	9	---*
Cowanesque River	COW-005	281.6 - 57.6 - 4.9	13	---*
Cowanesque River	COW-002	281.6 - 57.6 - 2.2	14	27
Cowanesque River	COW-001	281.6 - 57.6 - 0.5	20	251
Tioga River	TIO-056	281.6 - 55.6	0	0
Canisteo River	CAN-045	281.6 - 48.7 - 44.5	16	52*
Canisteo River	CAN-042	281.6 - 48.7 - 42.4	5	---*
Canisteo River	CAN-039	281.6 - 48.7 - 38.5	12	13,135*
Canisteo River	CAN-036	281.6 - 48.7 - 36.3	2	---*
Canisteo River	CAN-035	281.6 - 48.7 - 34.6	2	---*
Canisteo River	CAN-032	281.6 - 48.7 - 32.1	0	0
Canisteo River	CAN-031	281.6 - 48.7 - 31.3	8	384
Canisteo River	CAN-027	281.6 - 48.7 - 27.4	16	102*
Canisteo River	CAN-024	281.6 - 48.7 - 24.0	9	---*
Canisteo River	CAN-021	281.6 - 48.7 - 21.4	11	---*
Canisteo River	CAN-017	281.6 - 48.7 - 16.6	14	22*
Canisteo River	CAN-012	281.6 - 48.7 - 11.6	5	---*
Canisteo River	CAN-006	281.6 - 48.7 - 5.6	9	---*
Canisteo River	CAN-000	281.6 - 48.7 - 0.4	21	122

TABLE II (Continued)

Station Location	Station Code	River Mile	Bottom Organisms Number Of Kinds	Bottom Organisms Number Per Square Foot
Tioga River	TIO-048	281.6 - 48.0	13	39
Cohocton River	COH-038	281.6 - 45.1 - 38.0	16	176
Cohocton River	COH-025	281.6 - 45.1 - 25.0	11	670
Cohocton River	COH-018	281.6 - 45.1 - 17.6	18	512
Cohocton River	COH-006	281.6 - 45.1 - 6.0	18	707
Cohocton River	COH-001	281.6 - 45.1 - 0.5	24	380
Chemung River	CHM-044	281.6 - 44.3	11	95
Chemung River	CHM-042	281.6 - 41.9	13	147*
Chemung River	CHM-036	281.6 - 36.4	7	---*
Chemung River	CHM-030	281.6 - 29.8	2	---
Chemung River	CHM-026	281.6 - 25.8	18	68*
Newton Creek	NEW-005	281.6 - 24.9 - 5.3	6	---
Newton Creek	NEW-000	281.6 - 24.9 - 0.2	7	330*
Chemung River	CHM-019	281.6 - 18.7	14	---
Chemung River	CHM-013	281.6 - 12.2	11	71
Chemung River	CHM-005	281.6 - 4.9	20	514

TABLE III

BOTTOM ORGANISM DATA

WEST BRANCH SUSQUEHANNA RIVER AND TRIBUTARIES

Station Location	Station Code	River Mile	Bottom Organisms Number Of Kinds	Bottom Organisms Number Per Square Foot
West Branch Susquehanna River				
at Elmora, Pa.	WBS-237	237	1	---*
Chest Creek	CHS-001	205.3 - 1.0	9	17
West Branch Susquehanna River				
upstream from Curry Run, Pa.	WBS-201	200.7	2	---*
at Curwensville (Irwin Park), Pa.	WBS-185	184.6	0	0
at Clearfield, Pa.	WBS-174	174	0	0*
Clearfield Creek	CLR-001	171.5 - 0.8	2	---
West Branch Susquehanna River				
at Shawville, Pa.	WBS-163	163.1	0	0*
Moshannon Creek	MOS-034	135.5 - 33.5	1	---
Moshannon Creek	MOS-005	135.5 - 5.0	0	0*
Black Moshannon Creek	BLK-000	135.5 - 4.9 - 0	1	---
West Branch Susquehanna River				
at Karthaus, Pa.	WBS-132	132.3	0	0*
Mosquito Creek	MOQ-000	132.2 - 0	1	---
Driftwood Branch of Sinnemahoning Creek at Emporium, Pa.	DBS-035	110.2 - 35.0	5	---*
Sinnemahoning Creek -Portage Creek at Emporium, Pa.	SPC-000	110.2 - 34.9 - 0.1	3	---*
Driftwood Branch of Sinnemahoning Creek at Driftwood, Pa.	DBS-016	110.2 - 15.7	6	---*
Bennett Branch of Sinnemahoning Creek at Driftwood, Pa.	BBS-000	110.2 - 15.6 - 0.3	0	0
First Fork of Sinnemahoning Creek near Sinnemahoning, Pa.	FFS-000	110.2 - 11.9 - 0.4	7	13

TABLE III (Continued)

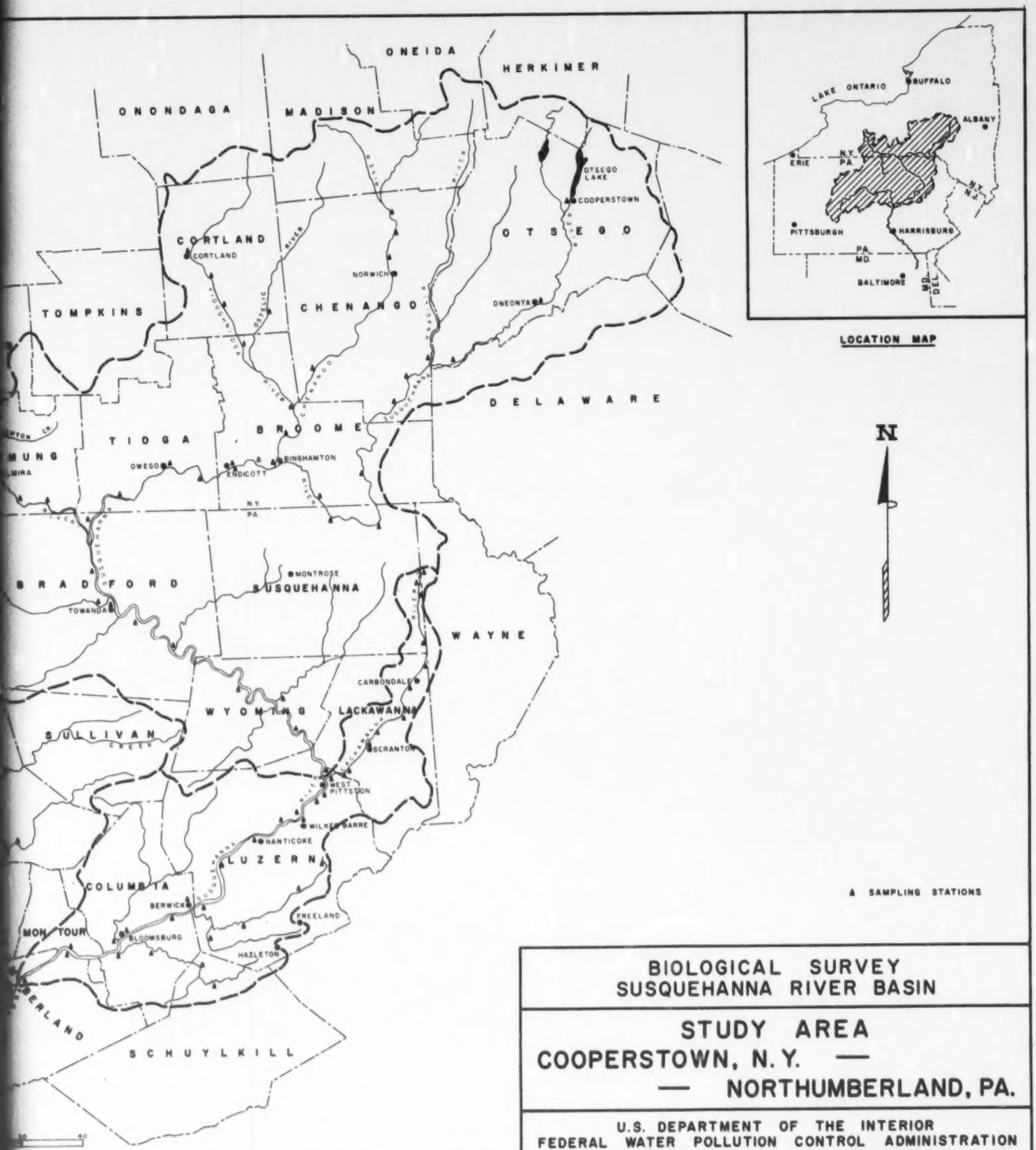
Station Location	Station Code	River Mile	Bottom Organisms Number Of Kinds	Number Per Square Foot
Sinnemahoning Creek at Keating, Pa.	SIN-000	110.2 - 0.4	0	0
West Branch Susquehanna River				
at Westport, Pa.	WBS-105	105	1	---*
Kettle Creek	KET-006	104.1 - 6.0	13	62*
Kettle Creek	KET-004	104.1 - 4.0	9	---
Kettle Creek	KET-002	104.1 - 2.0	0	0
Two Mile Run	TWO-000	104.1 - 1.8 - 0.1	0	0
Kettle Creek	KET-000	104.1 - 0.1	0	0
West Branch Susquehanna River				
downstream from Kettle Creek	WBS-104	103.9	0	0*
at Renovo, Pa.	WBS-098	97.7	1	---
at Lock Haven, Pa.	WBS-070	69.8	3	764
North Bald Eagle Creek		67.7		*
Spring Creek	SPN-015	67.7 - 28.1 - 15.0	13	---*
Spring Creek	SPN-013	67.7 - 28.1 - 12.5	3	---
Slab Cabin Run	SLB-002	67.7 - 28.1 - 11.0 - 1.5	7	---*
Thompson Run	THM-001	67.7 - 28.1 - 11.0 - 0.5 - 1.0	6	703
Slab Cabin Run	SLB-000	67.7 - 28.1 - 11.0 - 0	5	---*
Spring Creek	SPN-010	67.7 - 28.1 - 10.0	5	---*
Spring Creek	SPN-004	67.7 - 28.1 - 4.0	3	---*
Spring Creek	SPN-003	67.7 - 28.1 - 3.2	5	---
Logan Creek	LOG-003	67.7 - 28.1 - 3.0 - 2.5	9	556
Logan Creek	LOG-001	67.7 - 28.1 - 3.0 - 1.0	2	---*
Spring Creek	SPN-002	67.7 - 28.1 - 2.0	7	134
Spring Creek	SPN-000	67.7 - 28.1 - 0	5	79
North Bald Eagle Creek	NBE-029	67.7 - 28.6	17	445*
North Bald Eagle Creek	NBE-028	67.7 - 27.9	5	---
North Bald Eagle Creek	NBE-018	67.7 - 18.0	8	23*
Beech Creek	BEE-002	67.7 - 12.2 - 1.6	2	---
North Bald Eagle Creek	NBE-002	67.7 - 1.6	23	27
Pine Creek	PIN-001	57.6 - 1.0	14	3

TABLE III (Continued)

Station Location	Station Code	River Mile	Bottom Organisms Number Of Kinds	Number Per Square Foot
West Branch Susquehanna River				
at Jersey Shore, Pa.	WBS-056	56	9	67
Lycoming Creek	LYC-007	41.3 - 7.0	18	45
Lycoming Creek	LYC-001	41.3 - 1.0	14	37
West Branch Susquehanna River				
at Williamsport, Pa.	WBS-040	40.4	9	185
Loyalsock Creek	LYO-002	35.2 - 2.0	21	331
Muncy Creek	MUN-001	27.8 - 1.0	11	221
West Branch Susquehanna River				
at Montgomery Park	WBS-023	22.6	2	---*
at Watsonville, Pa.	WBS-016	16.0	7	---*
at Milton, Pa. (E. B.)	WBS-012	12.0	7	---
at West Milton (W. B.)	WBS-012	12.0	9	62
at Lewisburg, Pa. (E. B.)	WBS-008	7.6	6	192
at Lewisburg, Pa. (W. B.)	WBS-008	7.6	15	278
at Northumberland, Pa. (E. B.)	WBS-000	0.2	4	11
at Northumberland, Pa. (W. B.)	WBS-000	0.2	8	66

* Indicates a quantitative sample was not taken at this station.

ONONDAGA
CORTLAND
CORTLAND
TOMPKINS
SCHUYLER
ALLEGANY
STEUBEN
HORNELL
BATH
CORNING
CHEMUNG
ELMIRA
NEWTON CR.
TIOGA
OWEGO
ENDICOTT
N.Y.
PA.
COWANESQUE RIVER
CROOKED CREEK
TIOGA
BRADFORD
TOWANDA
POTTER
PINE CREEK
SULLIVAN
ELK
CAMERON
EMPORIUM
KETTLE CREEK
LYCOMING
WILLIAMSPORT
CLINTON
LOCK HAVEN
COLUMBIA
BERWICK
BLOOMSBURG
MONTOUR
UNION
LEWISBURG
NORTHUMBERLAND
CLEARFIELD
BELLEFONTE
CENTRE
STATE COLLEGE
SNYDER
SCHUYLKILL
CAMBRIA
SCALE IN MILES

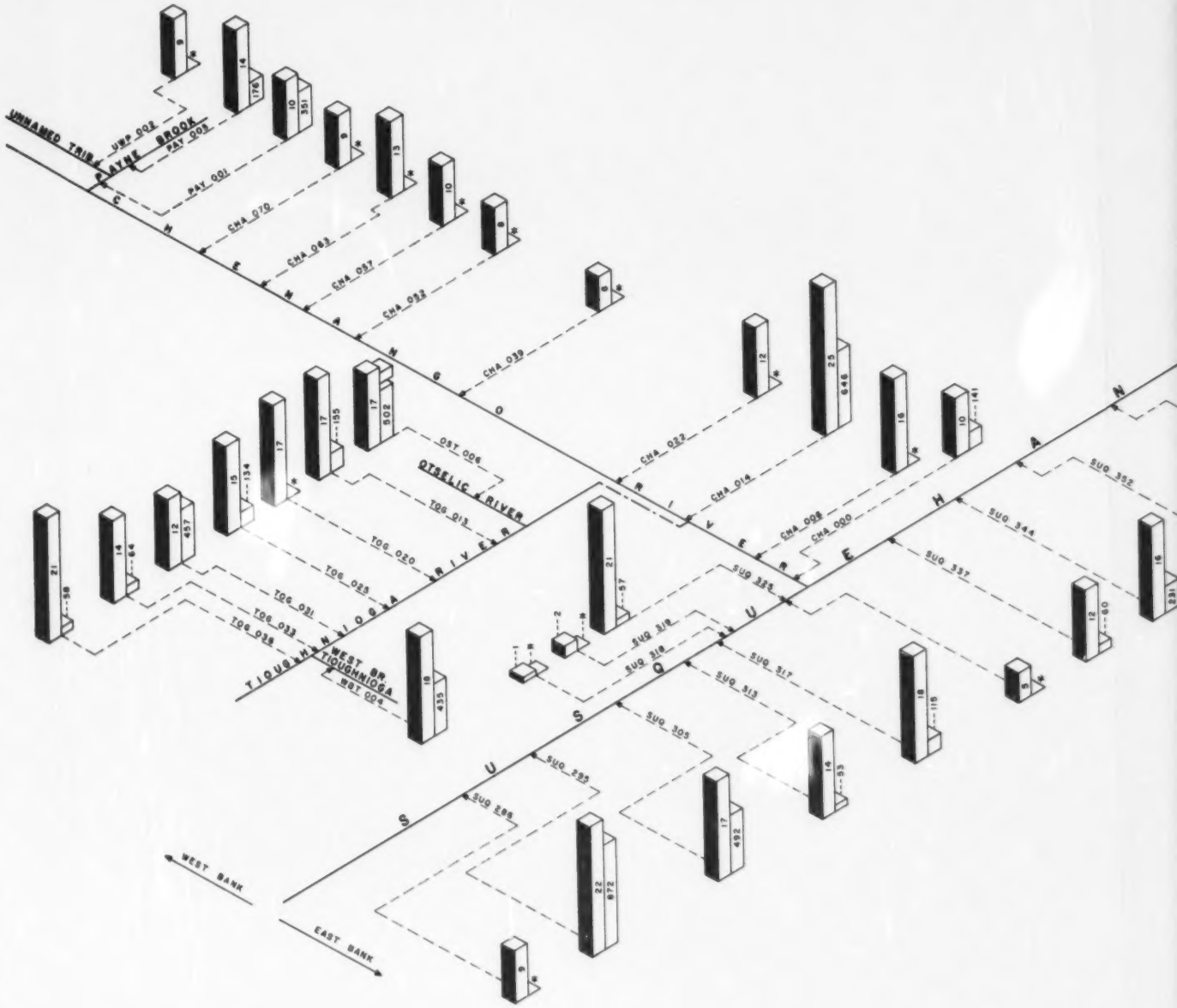


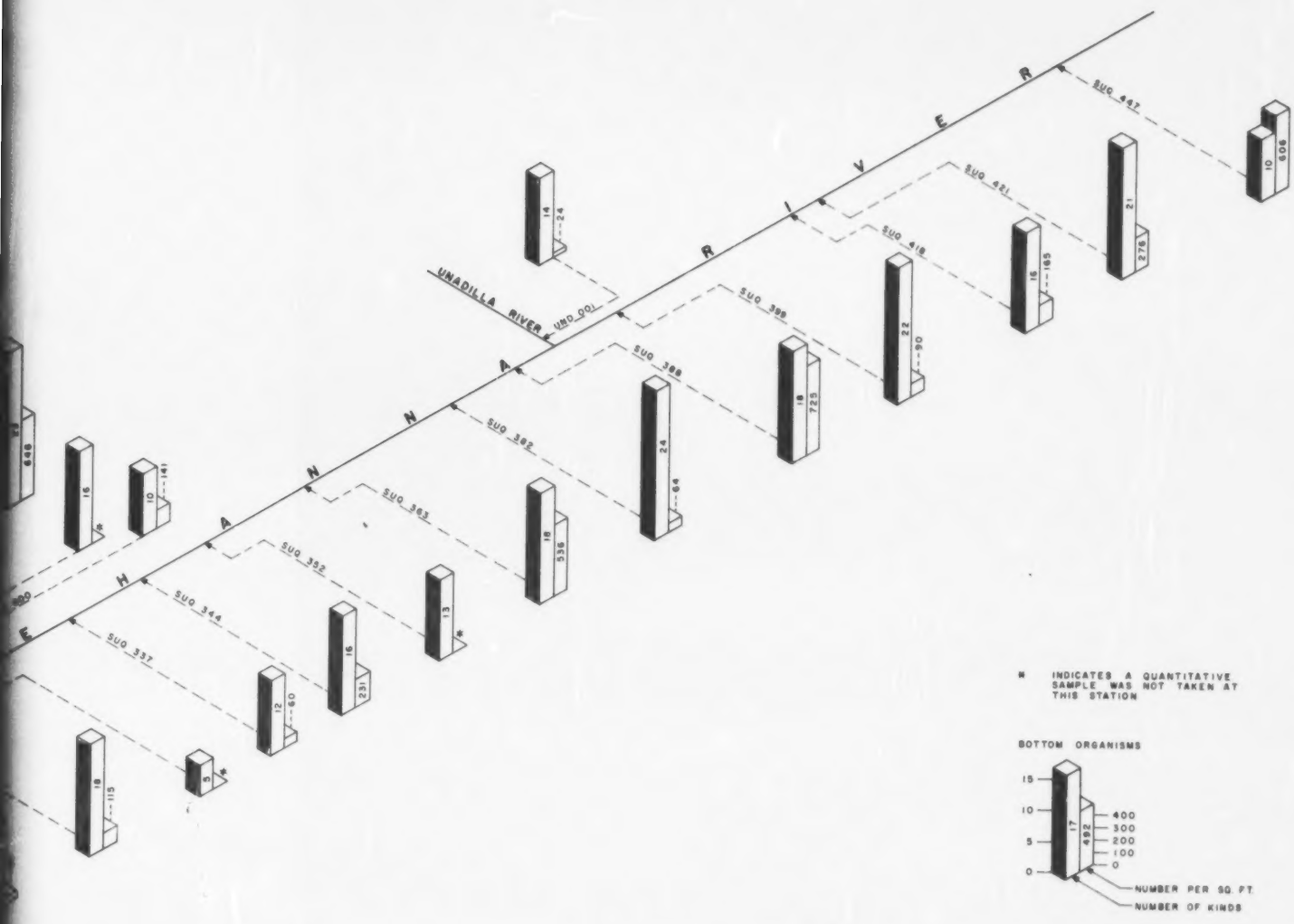
BIOLOGICAL SURVEY
SUSQUEHANNA RIVER BASIN

STUDY AREA
COOPERSTOWN, N.Y. — — NORTHUMBERLAND, PA.

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
MIDDLE ATLANTIC REGION CHARLOTTESVILLE, VA.

FIGURE 1


UNNAMED TRIB
WAYNE BROOK
WAY 002
WAY 001
PAY 001
CHA 070
CHA 062
CHA 037
CHA 032
CHA 039
CHA 033
CHA 014
CHA 008
CHA 000
OTSELIC RIVER
OST 004
TOG 013
TOG 020
TOG 023
TOG 031
TOG 033
TOG 028
TIOUGHNIOGA RIVER
WEST BR TIOUGHNIOGA
WST 004
SUG 324
SUG 326
SUG 316
SUG 317
SUG 313
SUG 305
SUG 295
SUG 296
SUG 352
SUG 344
SUG 337
WEST BANK
EAST BANK



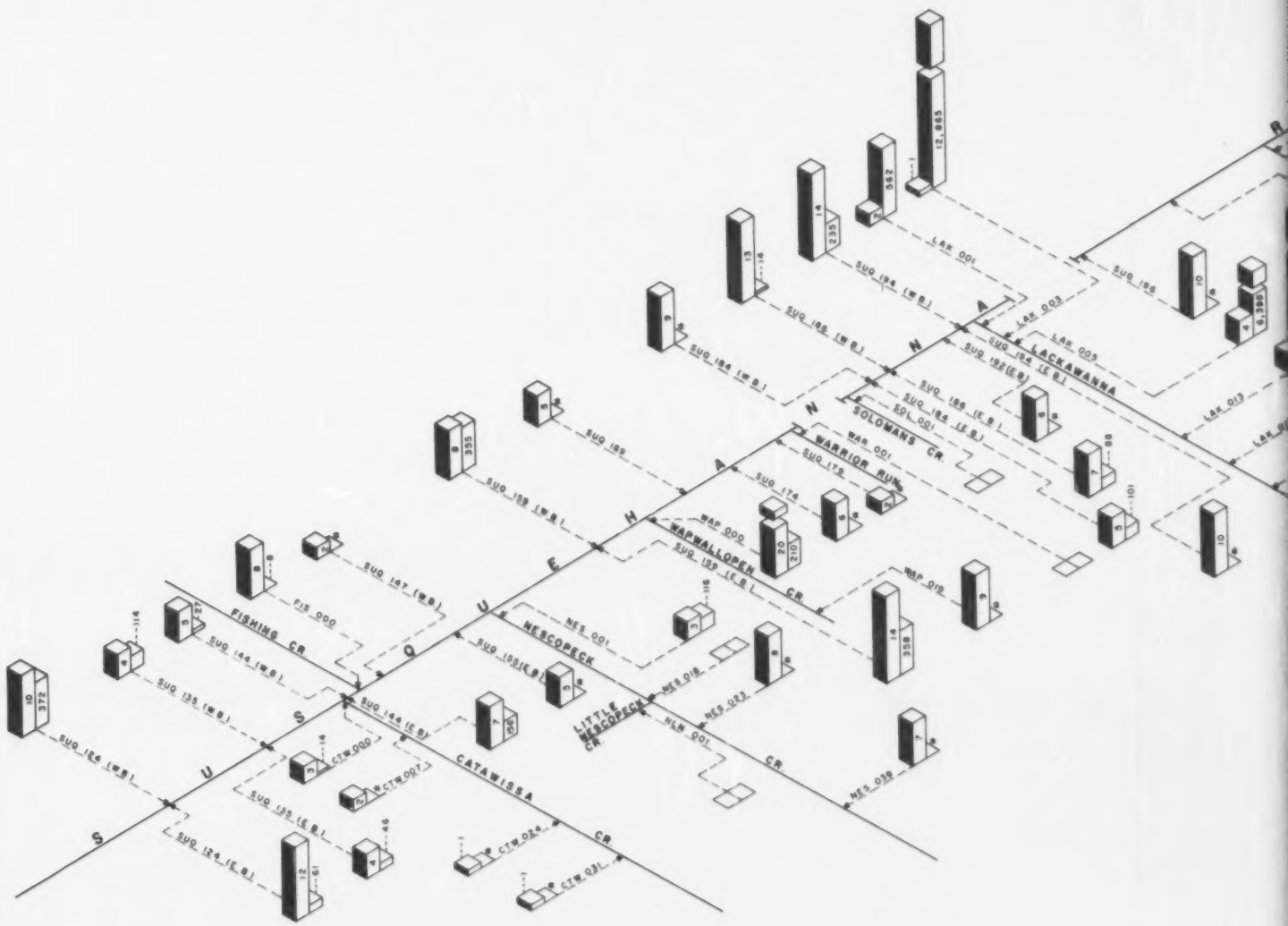
SCALE: 1" = 60 MILES

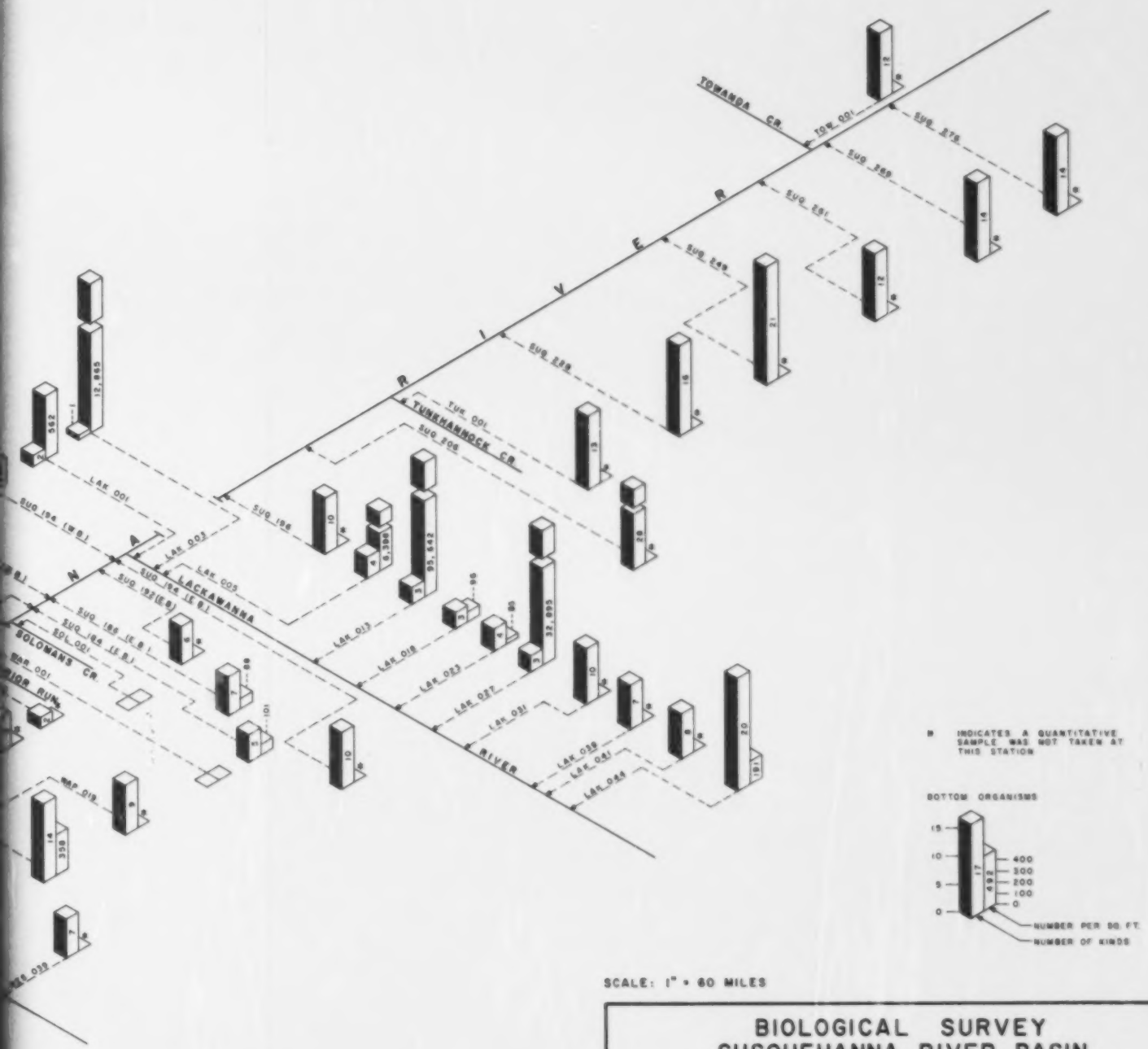
BIOLOGICAL SURVEY
SUSQUEHANNA RIVER BASIN

SUSQUEHANNA RIVER & TRIBUTARIES
COOPERSTOWN, N.Y. - SAYRE, PA.

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
MIDDLE ATLANTIC REGION CHARLOTTESVILLE, VA.

FIGURE 2


SUQ 194 (W B)
LAK 001
SUQ 195
LAK 003
LACKAWANNA
SUQ 195 (E B)
SUQ 194 (W B)
SUQ 196 (W B)
SUQ 196 (E B)
SUQ 194 (E B)
SOLOMANS CR
SOL 001
WAR 001
WARRIOR RUN
SUQ 198
SUQ 198 (W B)
SUQ 174
SUQ 172
WAP 000
WAPWALLOPEN
SUQ 199 (E B)
CR
WAP 012
SUQ 147 (W B)
FIS 000
FISHING CR
NES 001
NESCOPECK
SUQ 144 (W B)
SUQ 195 (E B)
SUQ 135 (W B)
SUQ 144 (E B)
NES 018
NES 022
LITTLE NESCOPECK CR
NLR 001
CR
NES 039
CTW 000
CTW 007
SUQ 124 (W B)
SUQ 139 (E B)
CATAWISSA
CR
CTW 024
CTW 031
SUQ 124 (E B)
S U S Q U E H A N N A



B INDICATES A QUANTITATIVE SAMPLE WAS NOT TAKEN AT THIS STATION

BOTTOM ORGANISMS

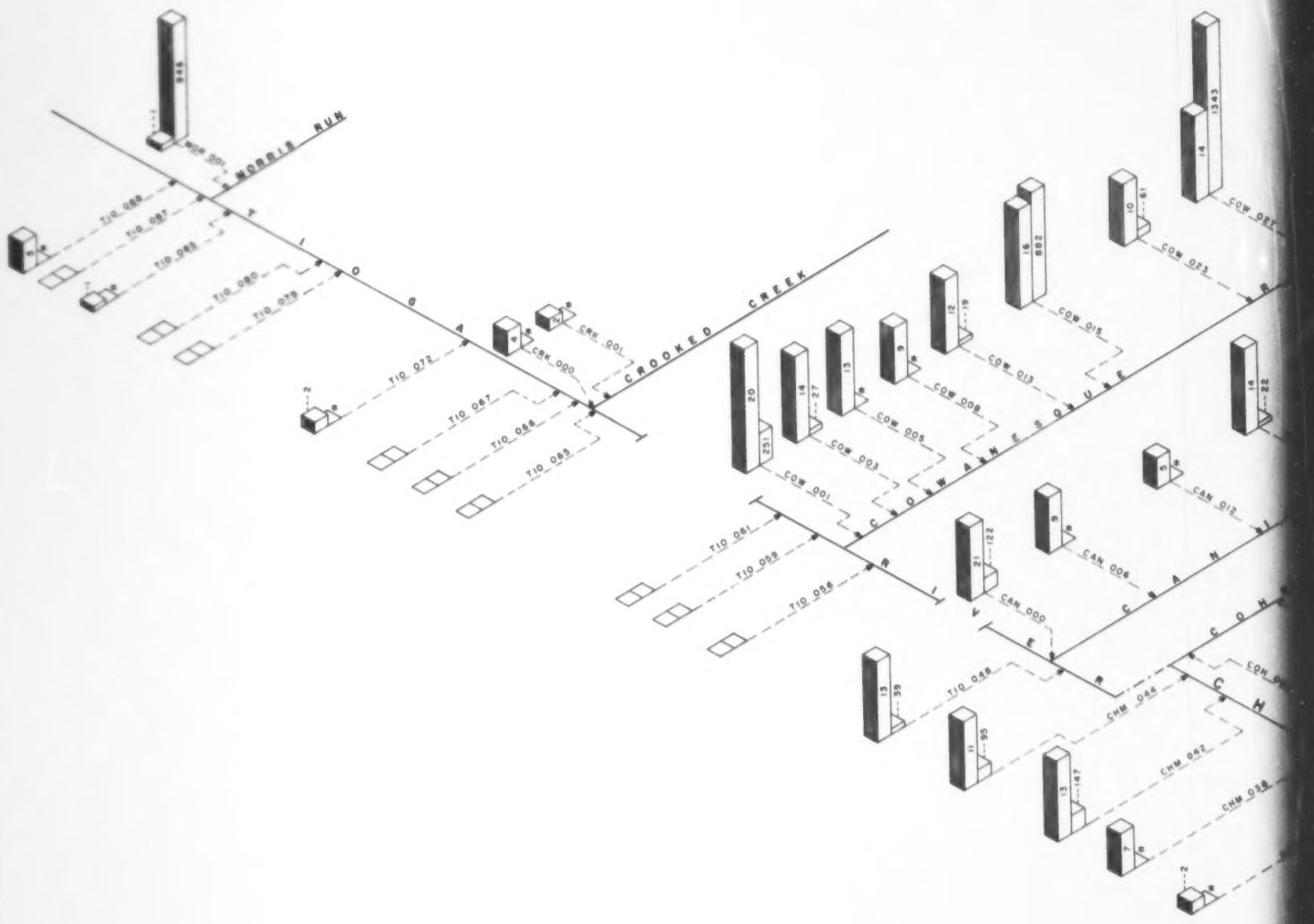
SCALE: 1" = 60 MILES

BIOLOGICAL SURVEY
SUSQUEHANNA RIVER BASIN

SUSQUEHANNA RIVER & TRIBUTARIES (ULSTER, PA. - NORTHUMBERLAND, PA.)

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
MIDDLE ATLANTIC REGION CHARLOTTESVILLE, VA.

FIGURE 3


WORRIS RUN
CROOKED CREEK
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TIO 087
TIO 088
TIO 080
TIO 079
TIO 072
TIO 067
TIO 066
TIO 065
CRK 001
CRK 000
COW 001
COW 003
COW 005
COW 008
COW 013
COW 015
COW 023
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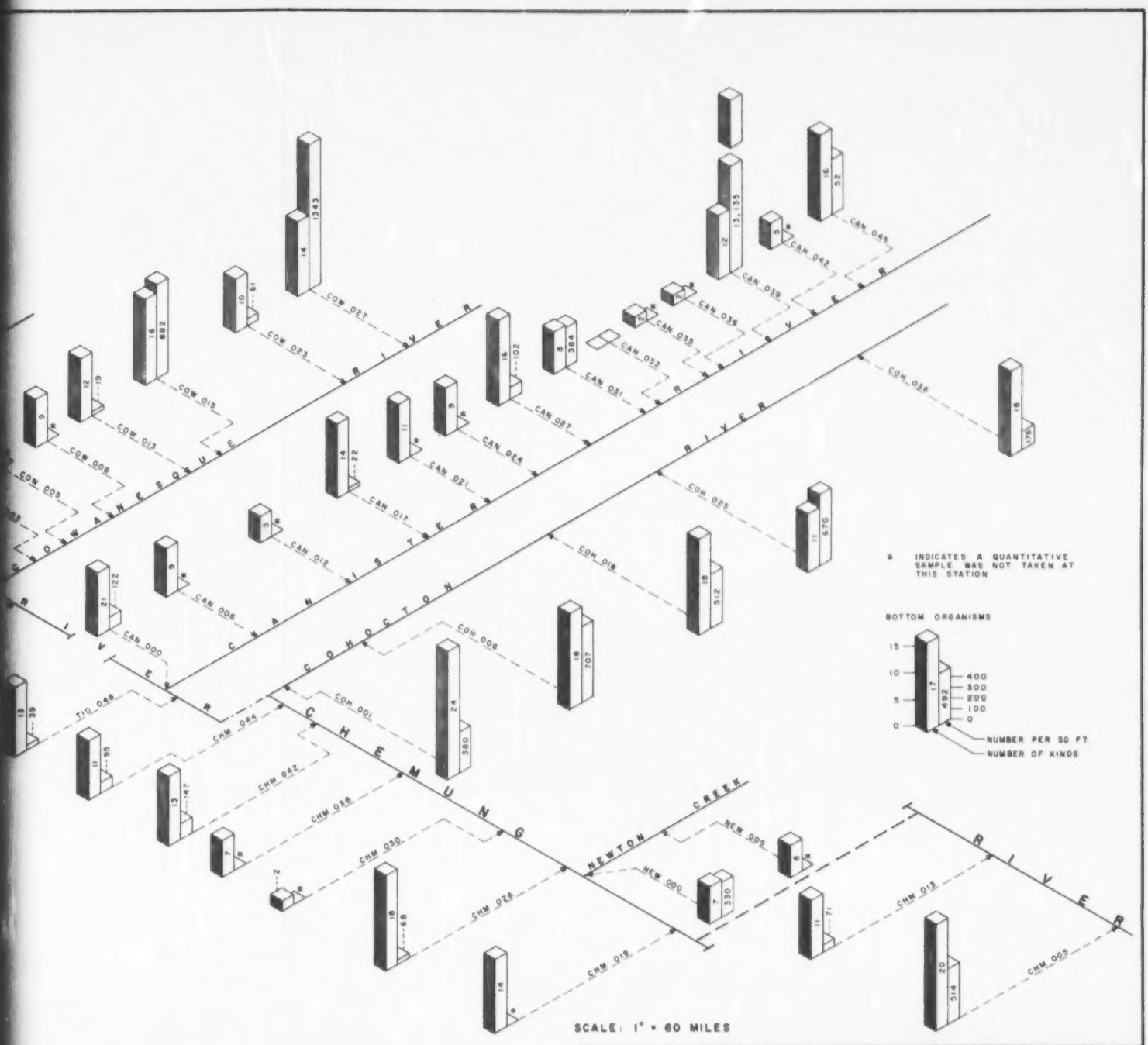
TIO 056
CAN 000
CAN 006
CAN 012
TIO 048
CHM 044
CHM 042
CHM 038

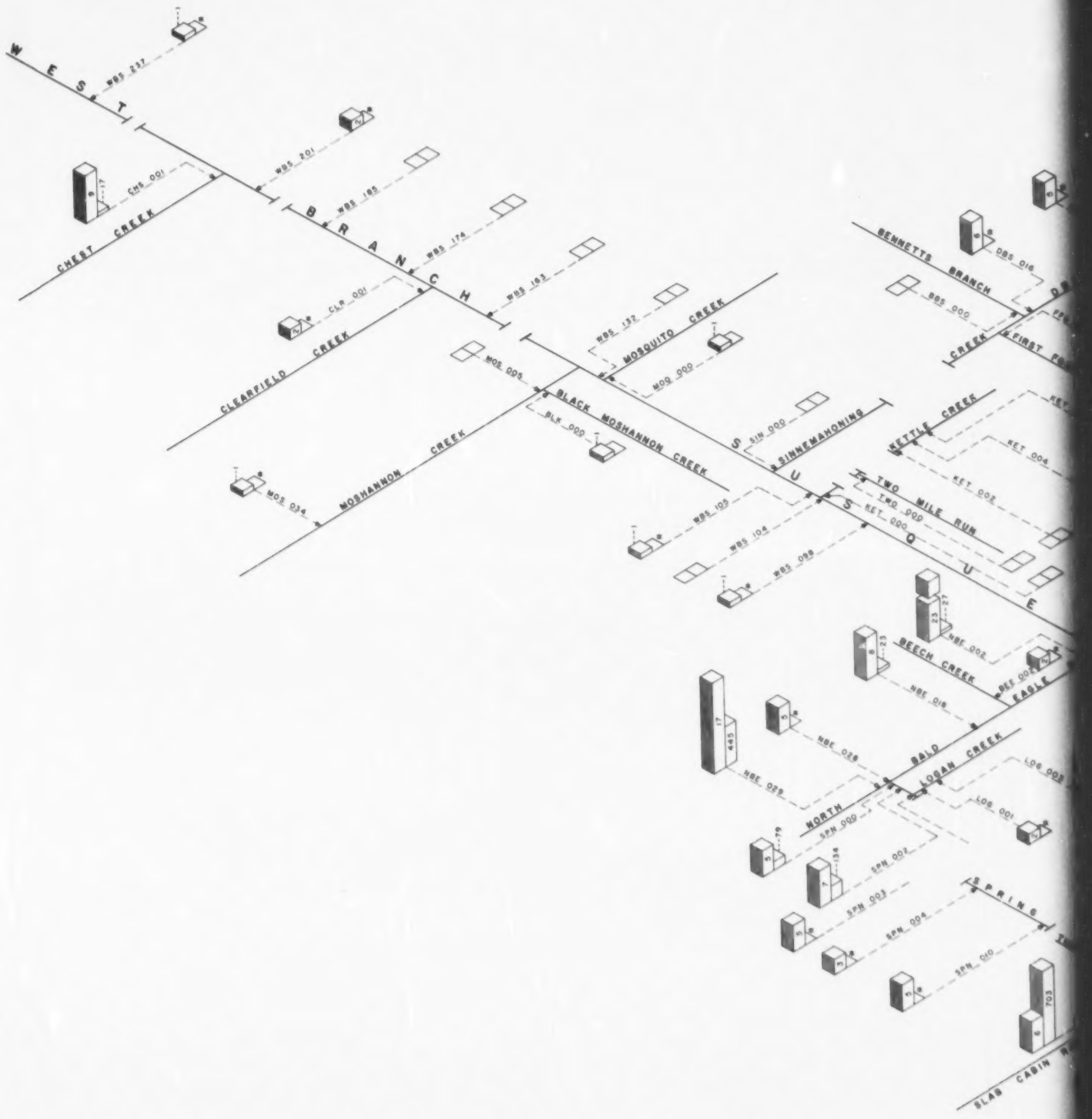


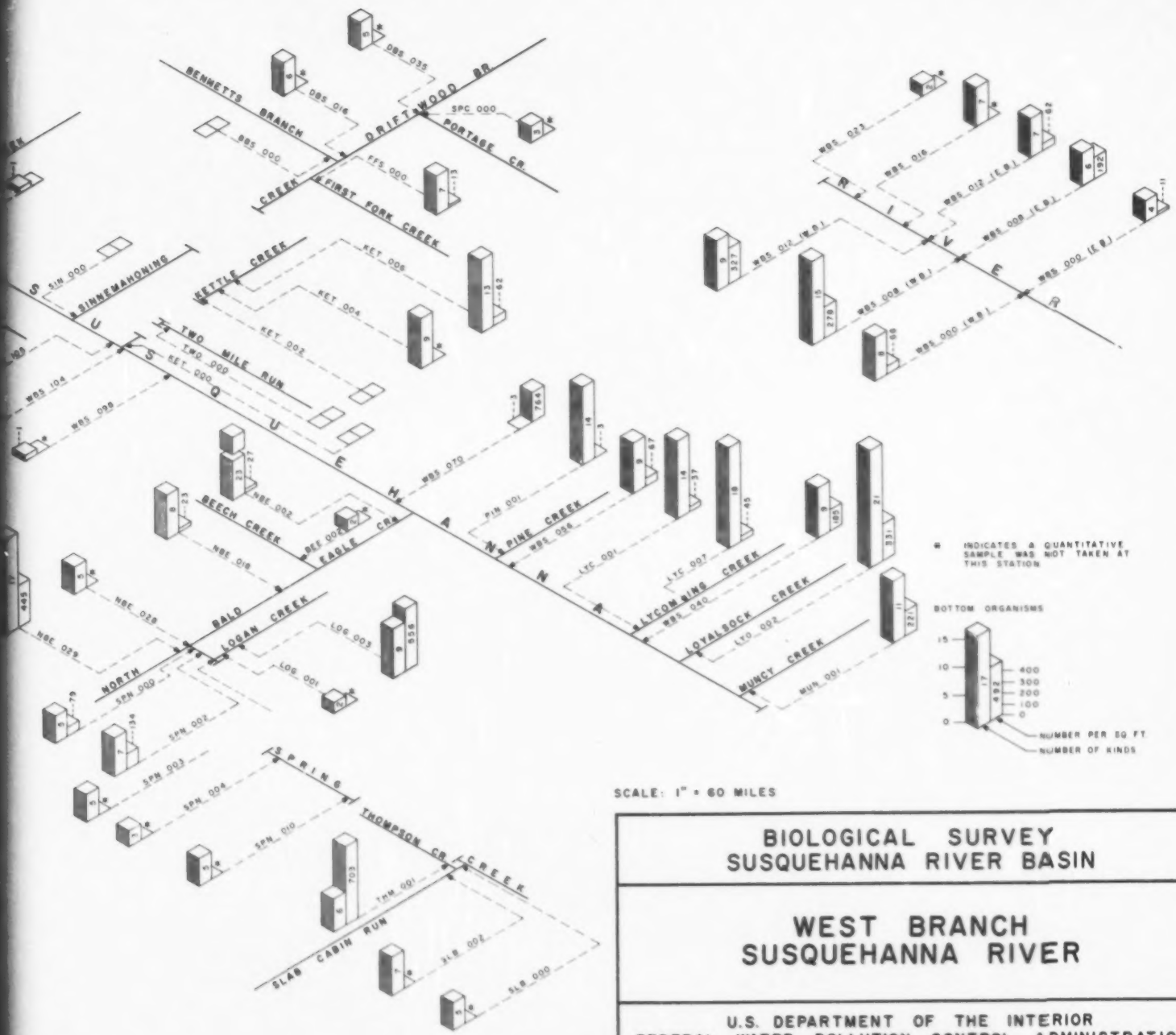
BIOLOGICAL SURVEY
SUSQUEHANNA RIVER BASIN

CHEMUNG RIVER AND TRIBUTARIES

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
MIDDLE ATLANTIC REGION CHARLOTTESVILLE, VA.

FIGURE 4


WEST BRANCH
WBS 232
WBS 201
WBS 185
WBS 174
WBS 163
CHS 001
CHEST CREEK
CLR 001
CLEARFIELD CREEK
MOS 034
MOSHANNON CREEK
MOS 005
BLF 000
BLACK MOSHANNON CREEK
MOSQUITO CREEK
MOQ 000
MQS 132
SIN 000
SINNEMAHONING
WBS 109
WBS 104
WBS 099
KET 000
TWO MILE RUN
TWO 000
KET 002
KET 004
KETTLE CREEK
BENNETTS BRANCH
OBS 016
OBS 000
FIRST
CREEK
NBE 002
NBE 004
NBE 016
BEECH CREEK
EAGLE
NBE 028
NBE 029
BALD
LOGAN CREEK
LOG 003
LOG 001
NORTH
SPN 000
SPN 002
SPN 003
SPN 004
SPN 010
SPRING
SLAB CABIN



SCALE: 1" = 60 MILES

BIOLOGICAL SURVEY
SUSQUEHANNA RIVER BASIN

WEST BRANCH
SUSQUEHANNA RIVER

U.S. DEPARTMENT OF THE INTERIOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
MIDDLE ATLANTIC REGION CHARLOTTESVILLE, VA.

FIGURE 5